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AUTOMOTIVE INDUSTRIES

IN THIS ISSUE

FTC Looks Again at F.O.B. Detroit

Completely New Fords for 1949

New Facilities for Testing High Output Turbines

Unconventional Methods in Making U-Flex Piston Rings

The Conditional 1949 Military Aircraft Program

Complete Table of Contents, Page 3

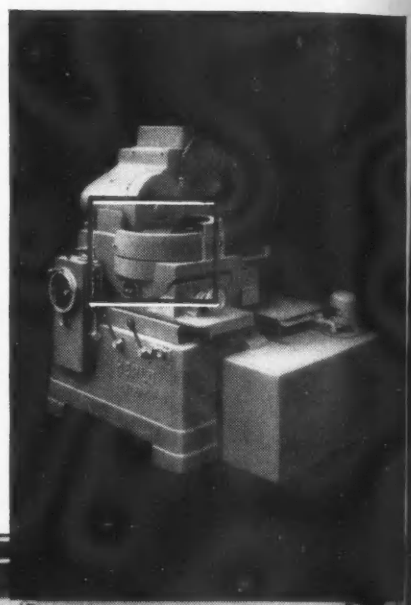
Extra CAPACITY and PERFORMANCE

On the Heald Model 261 Rotary, a completely new vertical column-type surface grinder

HERE'S an *entirely new* approach to precision surface grinding. In its new Model 261 Rotary, Heald has mounted the wheelhead on a rigid vertical column . . . runs the work in and out on a reciprocating table . . . and swivels a rotating, magnetic chuck up to 17° for angular grinding. Result: *more* capacity for *more* operations on *more* parts.

This is Heald's answer to industry demands for greater precision, smoother finish, maximum production. And it's only part of the answer—one of 19 *all-new* Heald Precision Grinders (surface and internal) and Bore-Matics.

Get in touch with the Heald branch office nearest you for complete details.



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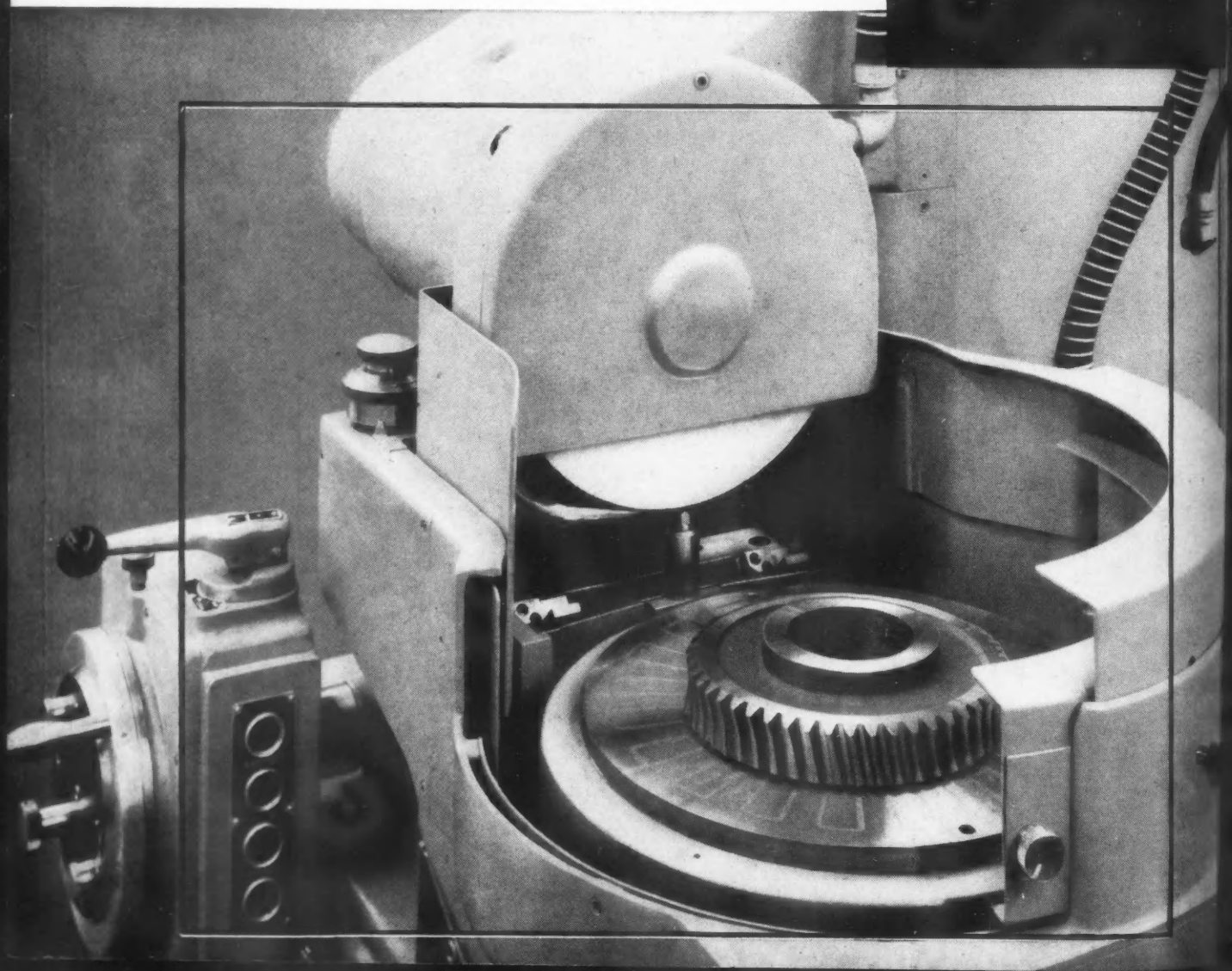

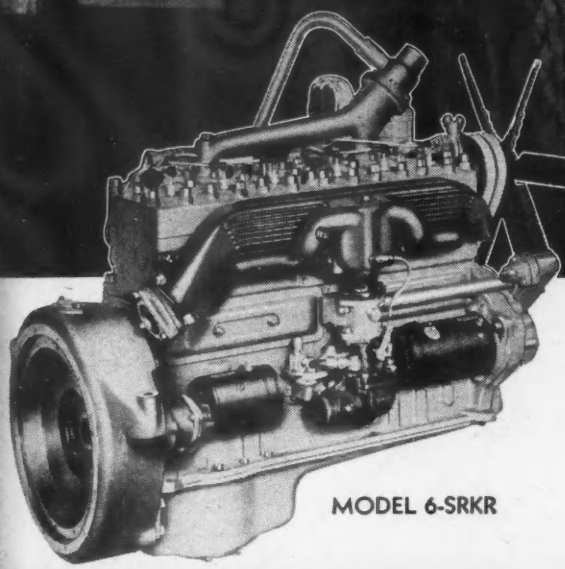

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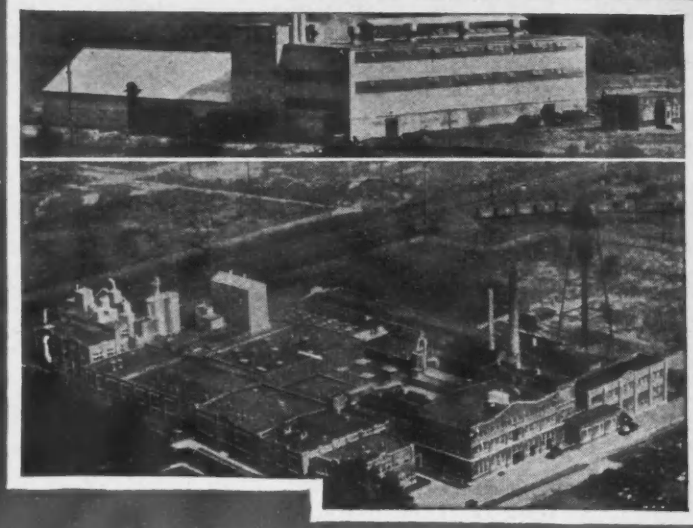

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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

June 15, 1948 Vol. 98, No. 11

Contents

High Spots of This Issue 15
News of the Automotive Industries 17
"F.O.B. Detroit" Under Scrutiny Again *By Eugene J. Hardy* 24
Organized Labor's Monopolistic Power Must Be Curtailed. *By Donald R. Richberg* 27
New Body + New Chassis Equals Completely New 1949 Ford. *By Joseph Geschelin* 28
Bath Contour Forming, a New Metalworking Process 32
Trends In Farm Tractors 34
J-35-A-15 Turbo-Jet Engine Production At Allison *By Joseph Geschelin* 35
U-Flex Piston Ring Production 38
Some Strings Attached to 1949 Military Aircraft Program. *By Robert McLarren* 40
Wright's New Facilities For Testing High Output Turbines 42
Export Tractor 45
New Production and Plant Equipment 46
Gramm Introduces First Model of Aluminum Trailer Series 49
New Products 50
Airbriefs. *By Robert McLarren* 54
Publications Available 56
Details of British Mamba Turbo-Prop 58
Observations. *By Joseph Geschelin* 60
Personals 62
Calendar 82
Business In Brief 90
Advertisers' Index 138

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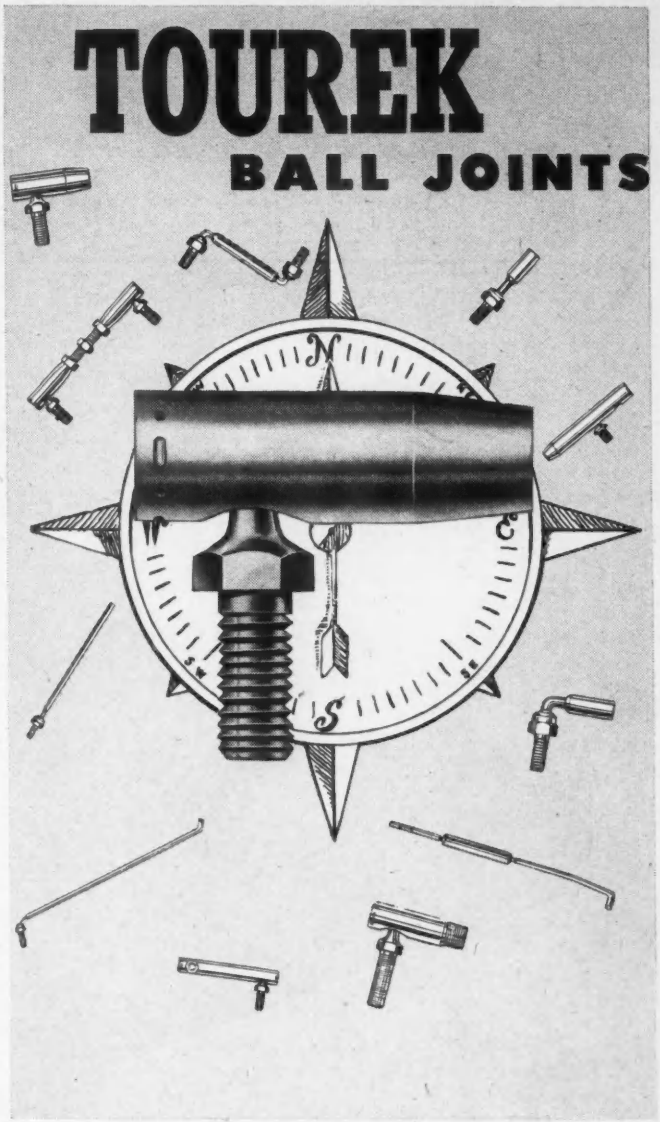

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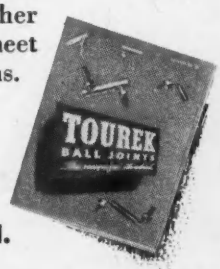

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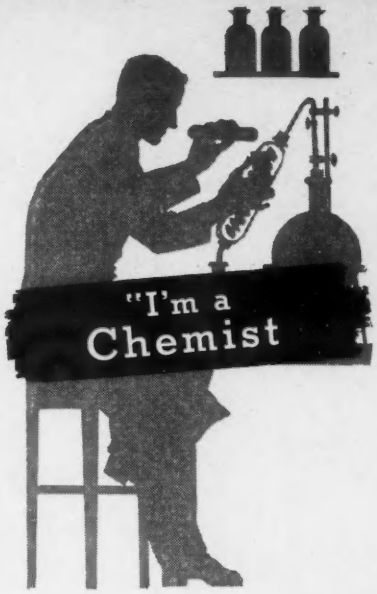

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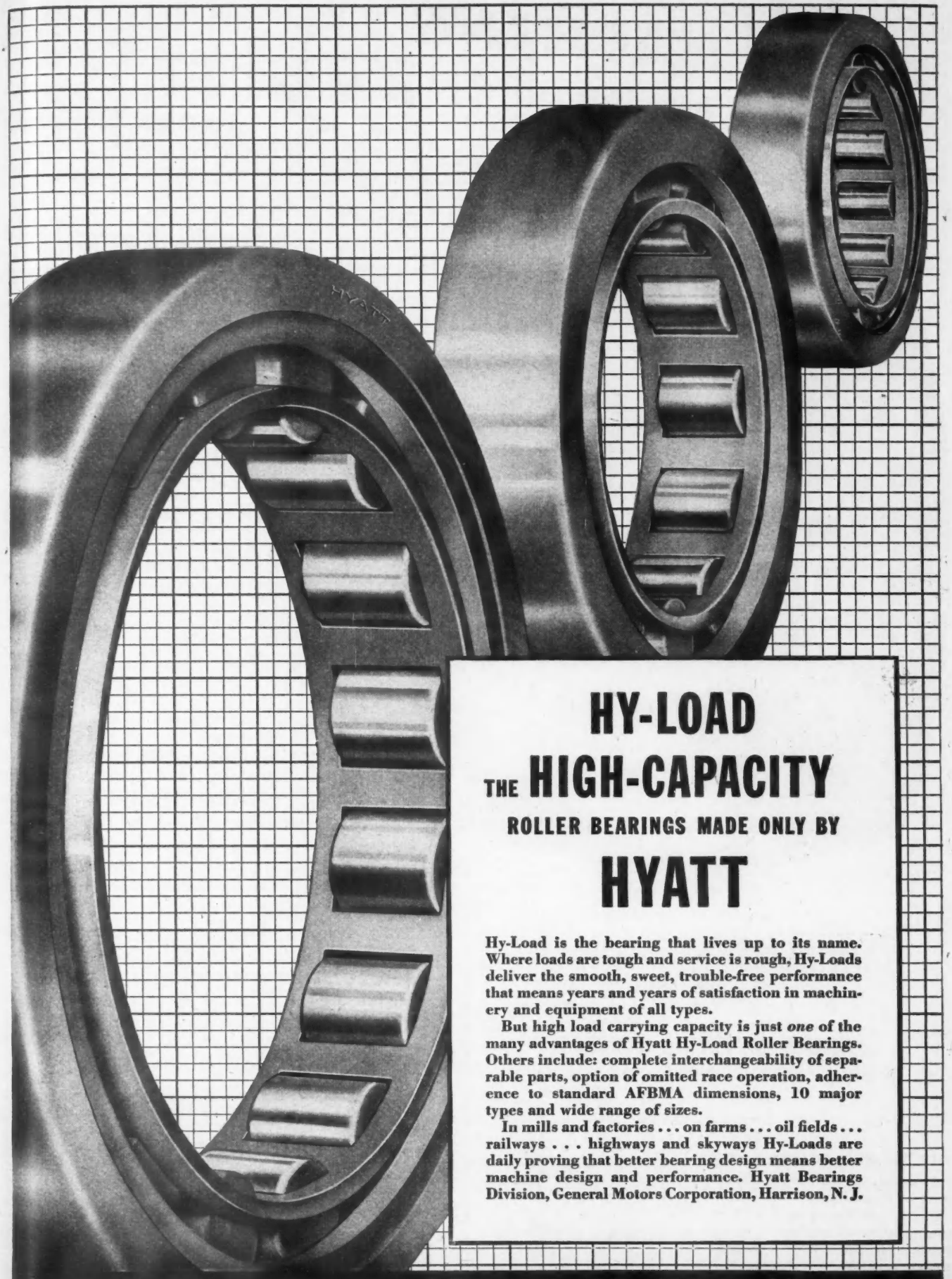

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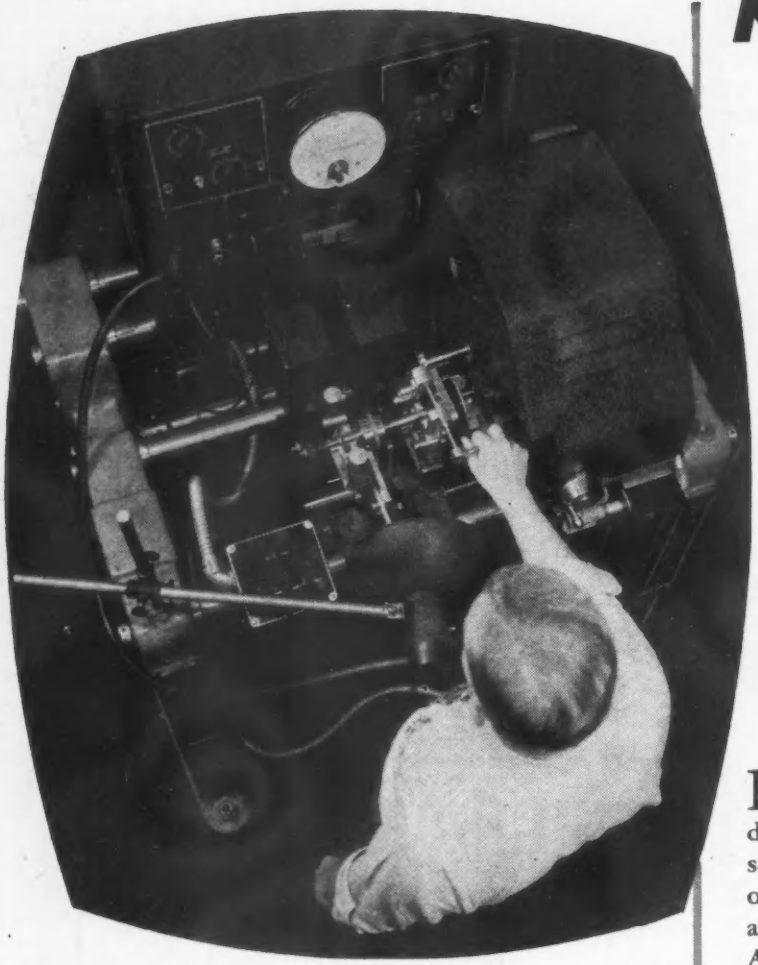
HYATT ROLLER BEARINGS

1 MACHINE handles all 3 STEPS

of the complete balancing process!



1 *Locates and measures the unbalance*

2 *Corrects the unbalance*

3 *Inspects for over-all accuracy*

at the rate of 100 PIECES PER HOUR!

Balancing these fans for vacuum sweepers is now done completely on *one* machine. It takes only a few seconds to locate and measure the unbalance. Then, the operator turns the piece to the proper angle and turns a hand-wheel to correspond with the meter reading. At the press of a button, a fly-cutter removes the exact amount of metal to bring the part into balance. The part may be rechecked if desired.

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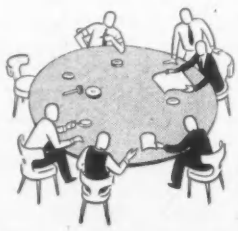

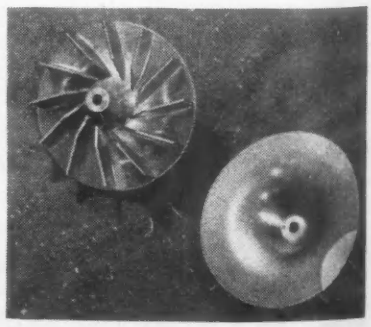

Showing front and back of fan with metal removed to correct unbalance. The entire balancing operation required an average of less than 45 seconds per piece.

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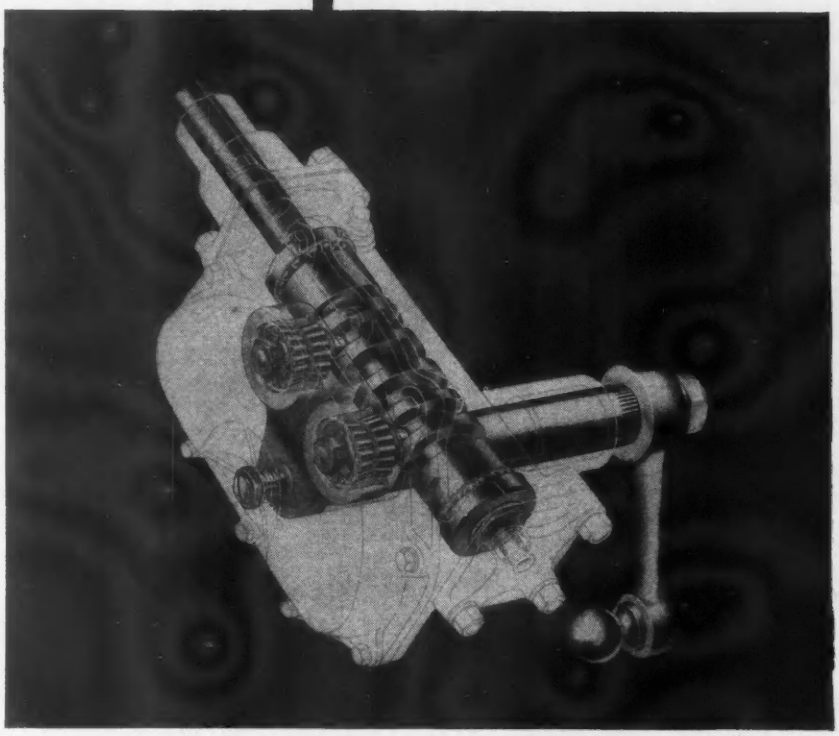

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ENGINES

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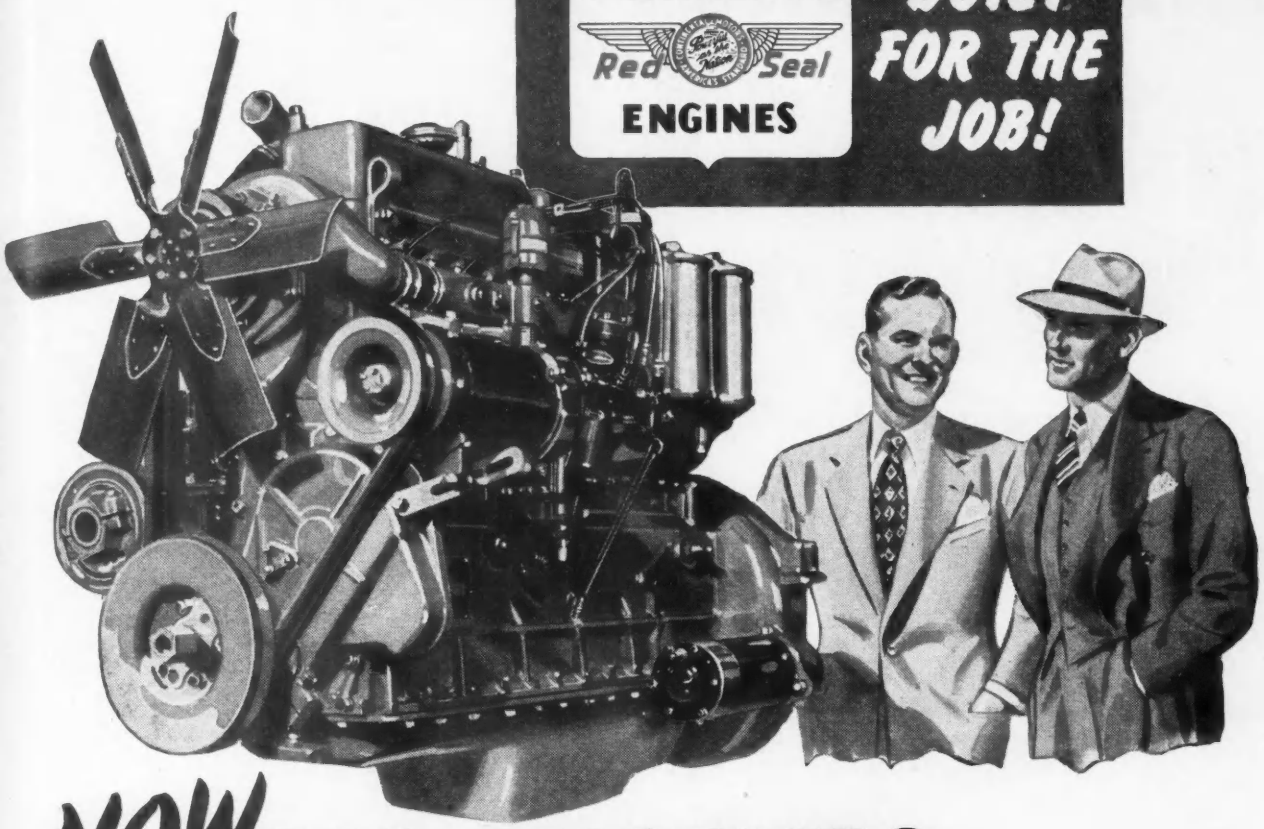

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DESIGNED FOR TRANSPORTATION

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R-6513:	170 h.p. at 2600 rpm.
B-6427:	130 h.p. at 2600 rpm.
B-6371:	100 h.p. at 2600 rpm.
M-6330:	105 h.p. at 2800 rpm.
M-6290:	95 h.p. at 2800 rpm.
M-6271:	90 h.p. at 2800 rpm.
F-6226:	75 h.p. at 3000 rpm.
F-6209:	70 h.p. at 3000 rpm.
F-6186:	60 h.p. at 3000 rpm.
F-4162:	55 h.p. at 3000 rpm.
F-4140:	50 h.p. at 3000 rpm.
F-4124:	45 h.p. at 3000 rpm.
Y-4112:	40 h.p. at 3000 rpm.
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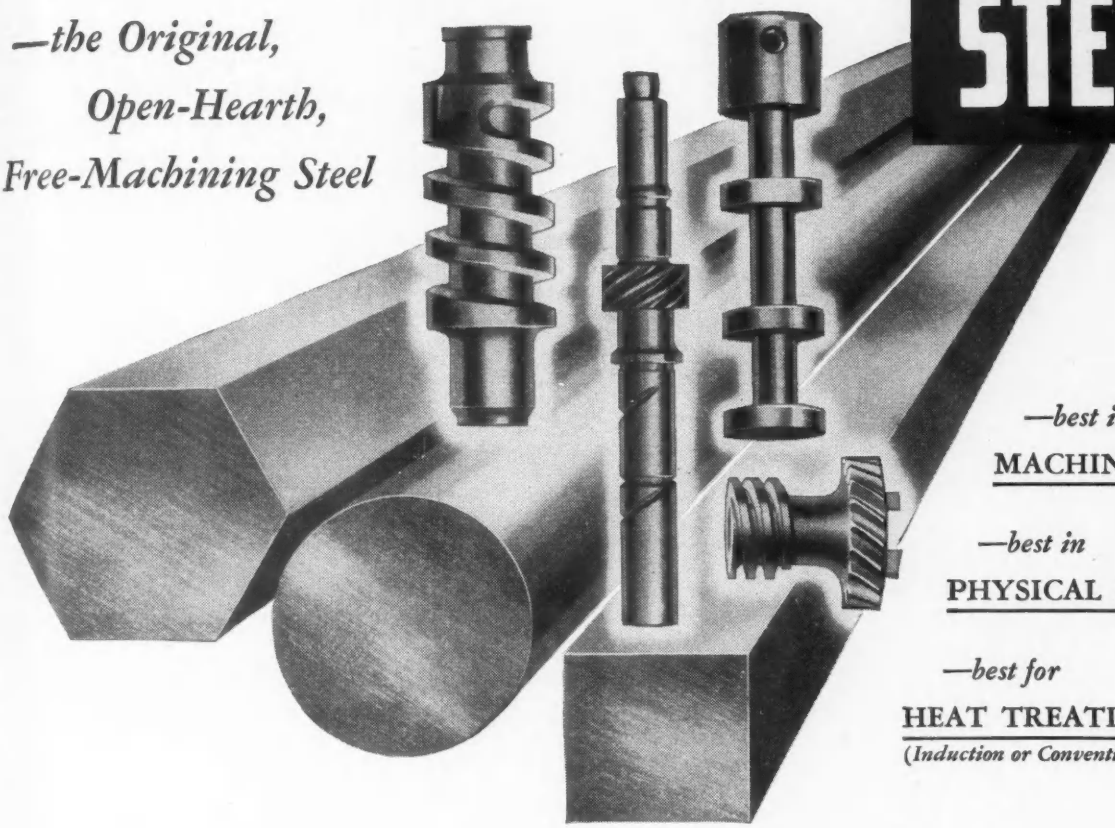

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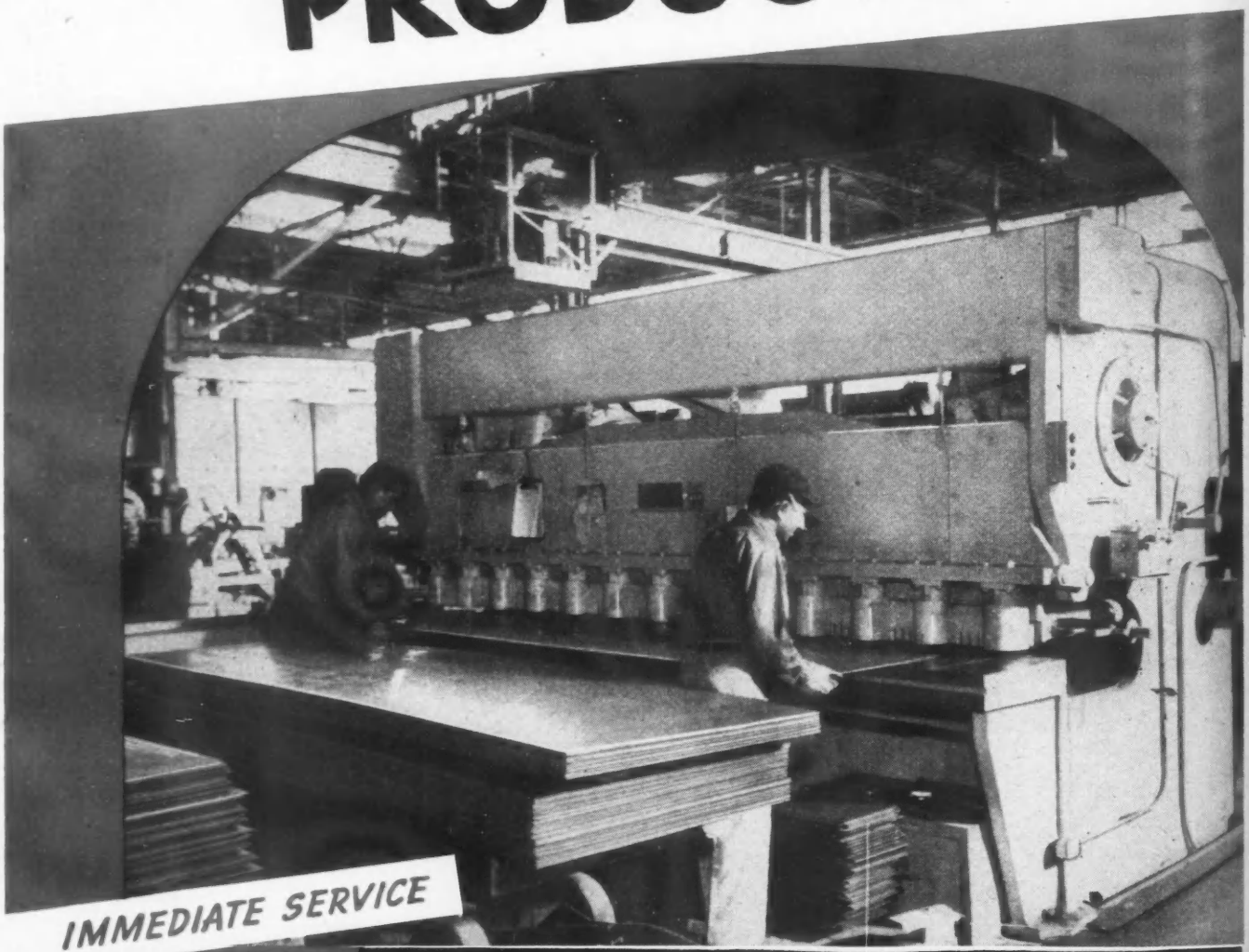

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& WIRE COMPANY

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CINCINNATI 16, OHIO
525 Township Avenue
AVON 2230

TELETYPE NUMBERS: CHGO 1269 • DET 33 • CIN 64

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Mar
H. H
W.
Jero
Robe
Leon
D
E. J.
Karl
Geo
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R. R
How
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C

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John
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Jun

AUTOMOTIVE INDUSTRIES

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

"F.O.B. Detroit" Under Scrutiny Again

Current attempts of the Federal Trade Commission to wipe out the basing point system of pricing in the steel industry pose significant problems for the automobile manufacturing industry. This article reviews a trend in court decisions which indicate current practices in the automobile industry may be violating the law. It makes worthwhile reading, page 24.

New Body and Chassis Changes in '49 Ford

Basic, dramatic, and radical design changes mark advances in '49 Fords over all predecessors. Both unique style treatment and new mechanical features completely break with traditional Ford engineering. This authoritative article, of intense interest to all, begins on page 28.

Turbo-Jet Production at GM's Allison Division

Following a continuous program of reseach and development the GE-Allison J-35-A-15 turbo-jet is being mass-produced for aircraft. The assembly system entailed in this set-up, of major interest in view of national preparation for air expansion, is amply illustrated and described on page 35.

Some Strings to 1949 Military Aircraft Program

The largest peacetime air program in U.S. history tends to put the aircraft manufacturing industry back into the military business. This article effectively points to the vast array of loopholes in the Government's three billion dollar Procurement Plan. How the aircraft industry will be affected can be learned on page 40.

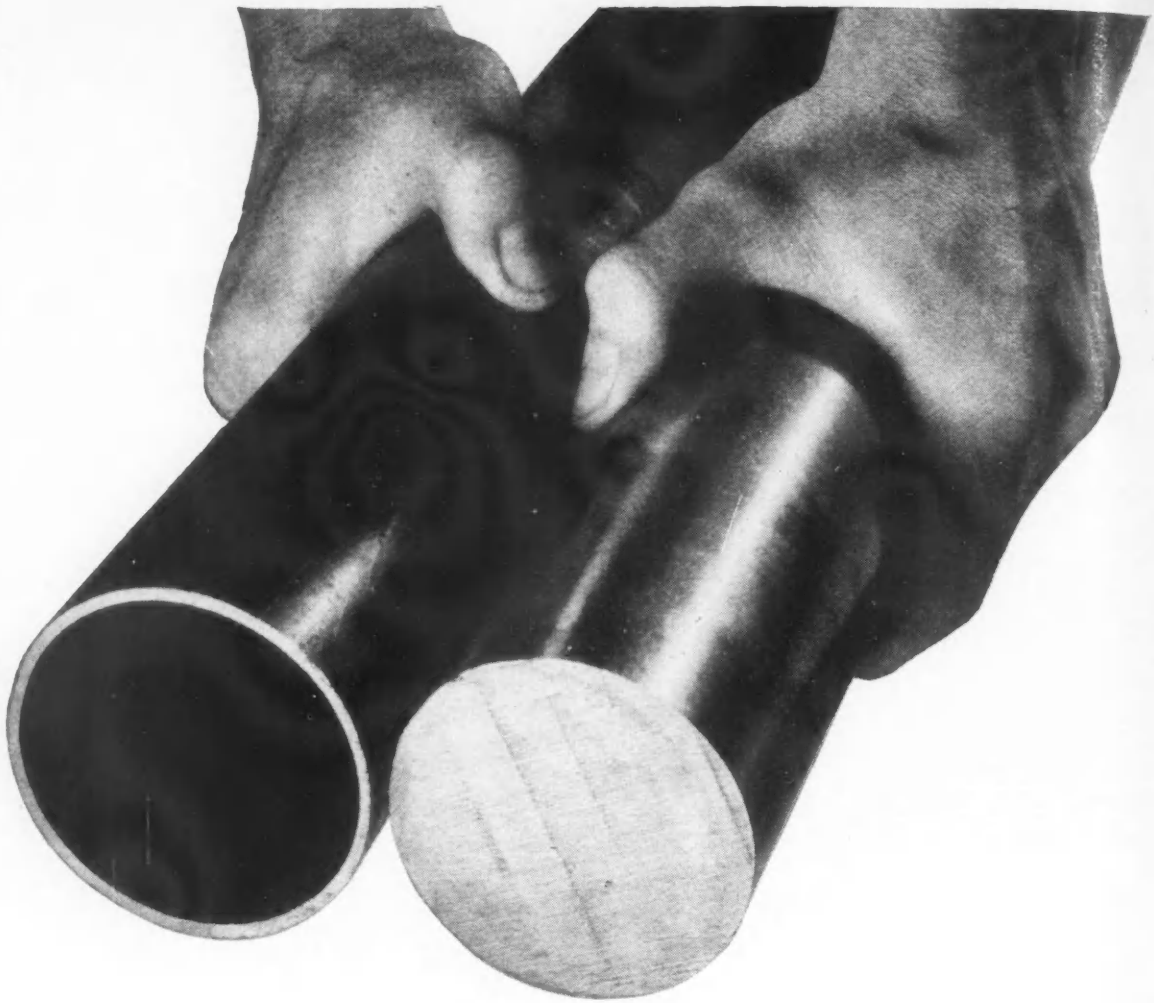
Gramm Introduces First Model of Aluminum Trailers

The ability of fleet owners to increase useful payload is decidedly "upped" with advent of light aluminum trailers. Here is described trailer construction of aluminum which favorably compares in structural strength with standard trailer construction of all-steel. You will find these fleet facts on page 49.

21 New Product Items And Other High Spots, Such As:

An editorial stressing that organized Labor's monopolistic power must be curtailed; a new metalworking process described as bath contour forming; trends in farm tractors; production of U-Flex piston rings; new facilities at Wright Aeronautical Corp. for testing high output turbines; and details of the British Mamba Turbo-Prop.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See page 3



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True—great demand sometimes depletes the supply of a kind or size here and there. Still, we probably have the largest over-all steel stocks in the country, and our cold finished bar and cold drawn tubing stocks are particularly good. Round bars range in size from 1/16" to 10" with analyses suitable for every application. Ryerson mechanical tubing stocks include sizes from 1/8" to 10½" O.D. in many wall thickness.

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MACHINERY & TOOLS—for metal working

RYERSON STEEL

NEWS of the AUTOMOTIVE INDUSTRIES

Vol. 98, No. 11 June 15, 1948

Ford Sells Johansson Div. to Brown & Sharpe

Ford Motor Co. has sold its Johansson Gage Div. to Brown and Sharpe Mfg. Co. of Providence, R. I., builders of precision tools. Included in the sale are rights to the trade name "Johansson" in the western hemisphere, plus the patents, methods, and machinery involved in the manufacture of the precision gage blocks. Ford manufactured and sold the "Jo" blocks for 25 years following an agreement in 1923 between the late Henry Ford and Carl Edward Johansson, inventor of the blocks. Machinery and stocks of special steel will be moved from Detroit to Providence, where enlarged facilities are being made available for the manufacture of the gages.

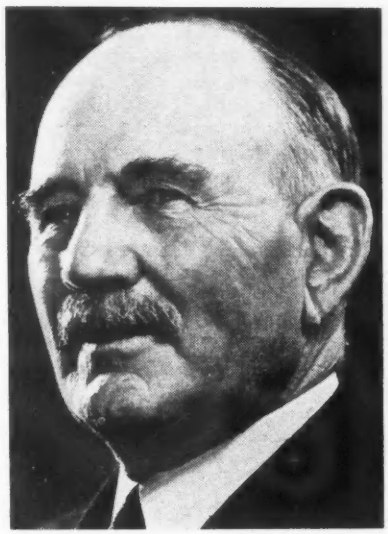
Packard Forms New Div. for Automatic Transmission

Packard Motor Car Co. has taken another step forward toward adoption of automatic transmissions for its cars. The company has appointed E. G. Patzkowsky as manager of its newly established automatic transmission division. His initial duties will be to obtain the engineering release for the transmission, form an organization, provide new machinery, tool up and put the job into production. Last September, George Christopher, Packard president, announced that a new automatic transmission was under development but would not be put into production until "all bugs have been engineered out". The company has not revealed details of the transmission, but it is understood to be a torque converter type.

Automobile Industry Near 100 Millionth Unit

The automobile industry in the United States will build its 100 millionth vehicle within the next two or three months. The exact date still is not known because it will be dependent somewhat upon production factors, but it is believed that the event will take place in either late August or September. Original plans had been considered for a ceremony commemorating the occurrence but these have been dropped. However, official notice will be taken at the time on a moderate scale. It required 29 years to build the first 25 million vehicles, starting with the year 1896. The next 25 million were built between 1925 and 1931 which included the largest production year to date, 1929, with 5,358,000. The third 25 million were built between 1931 and 1939. Because of the war, nine years were required for the last 25 million vehicles, although actual production was accomplished in five years of civilian output.

CHARLES W. NASH



1864-1948

From orphaned farm boy to nationally prominent, topflight industrialist, his life story exemplifies strikingly the priceless value of individual initiative under the American System of Free Enterprise. Among his many accomplishments, he is credited with originating the straight-line belt system of assembly.

President of Buick; President of General Motors; President and Chairman of the Board of Nash Motors; Chairman of the Board of Nash-Kelvinator. Member for many years of the Board of Directors of Automobile Manufacturers Association.

"A manufacturer should stick to building the kind of products that make a good name", he said. "That's Success".

Born—De Kalb County, Ill. Jan. 28, 1864

Died—Beverly Hills, Calif. June 6, 1948

May Car and Truck Output Poorest Since June '46

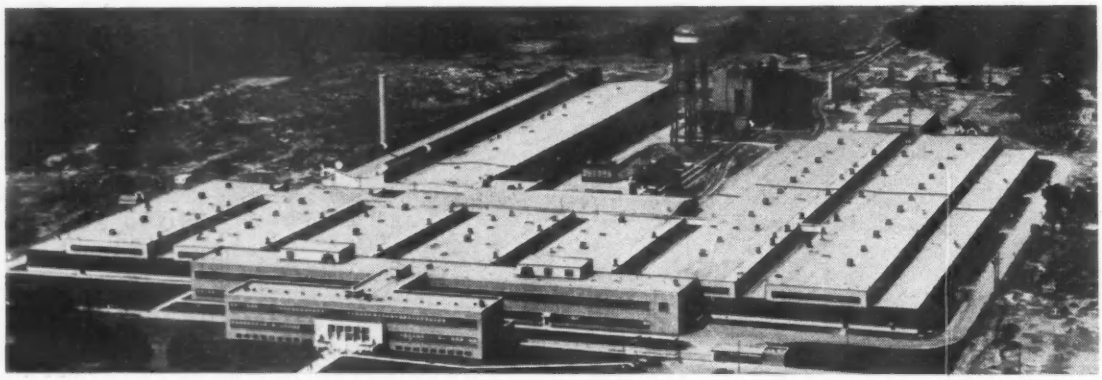
With May written off as the poorest automobile production month in almost two years, the industry has considerable optimism for high level production during June, July and August. The GM and Chrysler wage settlements have pretty much stabilized the labor situation in the industry, with other companies expected to follow without too much trouble. The only cloud on the horizon now is a possible coal strike this summer, but barring that, the outlook for sustained output is favorable. Chrysler plants went back into operation June 7, and once again all companies are operating. Production during May is estimated at 333,369 cars and trucks in the U. S. and 17,926 in Canada, for a total of 351,295, a very sad showing in comparison with the nearly 461,000 cars and trucks turned out in April. June, however, has 22 working days, and there are hopes of reaching a new high goal of 500,000 units. Ford production is gaining momentum rapidly after the model changeover, and Chrysler was able to accumulate steel during the strike, so that it may be able to push schedules upward later this month.

While more optimistic observers believe that the industry may yet reach its original goal of 5.5 million units this year, most factory officials still say that they will settle for the same output reached last year—about 5.2 million. The industry built its two millionth vehicle during the last week of May, indicating that it will have to produce at a considerably higher rate during the rest of the year to go over five million. However, there is plenty of belief that the last seven months will not see the interruptions that plagued the industry the first five.

New Lincoln-Mercury Plant Dedicated in N.J.

Ford's Lincoln-Mercury Div. has officially dedicated its new assembly plant at Metuchen, N. J. which began operation March 15. Ceremonies formally opening the plant were held June 14. The plant site includes 77 acres and the one-story steel and concrete buildings have a floor area of about 585,000 sq ft.

NEWS *of the* AUTOMOTIVE INDUSTRIES



GM OPENS

Located on a 142-acre site and containing 753,250 sq ft of floor space, this new branch plant of GM's New Departure Div. at Sandusky, O. is currently making about 1.7 million standard automotive size bearings a month. The production goal is about two million bearings a month.

New Departure Unit Features Progressive Assembly

Production at the new plant built by GM's New Departure Div. at Sandusky, O. is rapidly gaining momentum. The plant, which is on a 142-acre site and which contains 753,250 sq ft of floor space, has been built since the war at a cost of between $21 million and $23 million. About 40 per cent of the cost is for equipment. It is said to be the first straight line progressive operation for the manufacture of ball bearings, and at capacity will have an output of about two million bearings a month. The Sandusky plant is concentrating production entirely on automotive size bearings. The management hopes to cut production costs 10 to 15 per cent in the new plant and believes that eventually it will be the largest ball bearing works in the world. In its new location in the mid-west, the division can not only reduce its shipping costs to customers by about one half, but also can make much faster delivery than it could from its previous location in Connecticut. The plant is all on one floor in order to facilitate progressive handling, and is modern in every detail.

See No Trend in GM-UAW Wage Agreement

Although there has been a great deal of talk about the General Motors wage settlement setting a pattern formula for other companies in the industry, actually, there sems to be little trend in that direction. Briefly, the GM agreement with the UAW-CIO and the UE-CIO ties a wage increase of eight cents an hour, plus three cents annual improvement factor, to the cost of living. If the BLS cost of living goes up or down, wage rates follow, with the qualification that they cannot drop more than five cents an hour during the life of the two-year contract. At the beginning of the second year, three cents an hour is added as the improvement factor. The Chrysler agreement provides a straight raise of 13 cents an hour across the board with no relationship to the rise or fall of living costs. The two-year contract is reopenable once on the issue of wages. In both cases demands for pensions, hospitalization insurance, and guaranteed annual wages were dropped. In the case of GM the union shop issue, which also had been a heated issue, was dropped when the corporation agreed to voluntary dues checkoff subject to approval by NLRB. Chrysler also granted increases of eight per cent, with a minimum of $20 a month to salaried personnel. GM granted a four per cent increase with a $25 cost of living extra every three months, which will be adjusted upward or downward by $5 for each change of 1.14 points in the BLS index.

Prices of 1949 Fords Up Average 8.7%

The prices of the new 1949 Ford models are an average 8.7 per cent higher than the current Ford prices. The new price increases range from $85 to $125, according to Henry Ford II, president, who pointed that the company's bill for parts and materials is already $145 million more per year than in 1946. The new prices follow:

	1949 List Excl. of State and Fed. Taxes $	Increase Over '48 List Price $
Ford 6		
Bus. Cpe.	1163	85
Tudor	1233	100
Fordor	1293	105
Club Cpe.	1253	...
Ford 8		
Bus Cpe.	1255	105
Tudor Sedan ...	1315	110
Fordor Sedan ..	1375	115
Club Coupe ...	1355	...
Ford 6 Custom		
Tudor	1340	115
Fordor	1405	120
Club Cpe.	1360	115
Conv. Cpe.	1684	...
Stat. Wagon ...	1905	125
Ford 8 Custom		
Tudor Sedan ...	1415	120
Fordor Sedan...	1475	125
Club Cpe.....	1440	120
Conv. Cpe.	1760	125
Stat. Wagon ...	1980	125

Name Cohu President of Convair

LaMotte T. Cohu, former head of Trans-Continental & Western Air, Inc., and Northrop Aircraft, Inc., has been formally elected president and general manager of the Consolidated Vultee Aircraft Corp. Harry Woodhead, former Convair president, has been elected to the newly created post of vice chairman of the board of Convair.

Detroit Waiting Effect of Two Supreme Court Decisions

While two recent Supreme Court decisions may eventually have important effects on the automotive industries, most spokesmen in Detroit are adopting a "wait and see" attitude. They point out that in all such broad general decisions as were made in the Cement Industry and Morton Salt cases, (see pages 24 and 25 of this issue) there is considerable ambiguity about their application to specific conditions applying to other companies and industries. A major effect on the automobile industry might come through disruption of the traditional multiple-basing-point system of pricing on steel if FTC should elect to throw it out. Another possible area of difficulty might be the fob pricing of automobiles at home factory points, although this practice has been modified somewhat in recent years through zone prices. The quantity discount question might affect automotive parts merchandising particularly among independent parts companies and distributors.

Weiland Made Chairman of Wilson Foundry

Arthur J. Weiland, executive vice president of Willys-Overland Motors, has been elected chairman of the board of Wilson Foundry & Machine Co., wholly-owned Willys subsidiary. The foundry furnishes all blocks for Willys engines and about two-thirds of its production goes to other automotive customers.

NEWS *of the* AUTOMOTIVE INDUSTRIES

William Ford Elected Ford Director

Shareholders of Ford Motor Co. have elected William Clay Ford, son of the late Edsel Ford and brother of Henry Ford II, a director of the Ford Motor Co. He succeeds B. J. Craig, who resigned from the board after five years as a director, but who will remain as secretary-treasurer of the Ford Foundation. William Ford holds 22 per cent of the voting stock in the company.

GM Canadian Subsidiary to Make Eaton Truck Axles

Eaton Mfg. Co. has completed arrangements with McKinnon Industries, Ltd., General Motors subsidiary, for the manufacture of Eaton's two-speed truck axles at St. Catherines, Ont. The action was taken to help Canadian truck builders conserve dollar exchange quotas.

Dedicate Third New B-O-P Plant

The last of the three new Buick-Oldsmobile-Pontiac assembly plants built since the end of the war has just opened. The new unit at Doraville, Ga., on the outskirts of Atlanta, was formally dedicated June 15. The Wilmington, Del. plant opened in February, and production at the Framingham, Mass. plant is now getting underway. The Atlanta unit will furnish Buick, Oldsmobile and Pontiac cars to dealers in five southeastern states, and, in addition, will serve parts of three others. The building has a roof area of more than 17 acres, and includes new overhead type conveyors on the chassis line and downdraft air and water ventilating systems in all paint spray booths. Employment in normal production will be about 1500.

Briggs to Supply Willys With Bodies and Parts

Briggs Mfg. Co. has completed arrangements to become a major supplier of station wagon bodies and body stampings, and parts for trucks and other vehicles for Willys-Overland. Briggs replaces Hayes Mfg. Corp. of Grand Rapids as supplier for station wagon bodies. Fifty per cent of Briggs production for Willys will be complete bodies for the Jeep station wagon and station sedan and the remainder will be knock-down panels, floor pans, and doors for the Willys panel delivery, instrument panels for the Jeepster, and doors and supporting members for trucks. Production of station wagon and station sedan bodies is expected to reach a rate of 250 a day. Briggs was a Willys supplier at various intervals from 1925 until the start of the war.

Army Ordnance Asks Funds for Combat Vehicles

First indication of the impact of the accelerated military defense program on the automobile industry is a report from Washington dealing with requests by the Army Ordnance Dept. for military and combat vehicles. According to the report, Army Ordnance has asked Congress to appropriate $117,437,149 for new trucks, and $39,988,170 for spare parts. For combat vehicles the request is for $165,871,843, with an additional $72,656,525 for spare parts. The number and type of trucks and combat vehicles was not made public. The request includes the regular budget plus supplementary funds based on the stepped-up military program. According to truck manufacturers, the request, if granted, will not materially affect domestic production since most military trucks are in the heavier weight categories, which currently are not in excessive demand. It is also believed that the number of combat vehicles required could be built without affecting other production. It is understood that Army Ordnance will ask for an appropriation of $3.5 million to purchase passenger cars for the 1949 fiscal year. An additional $300,000 for passenger car purchase is also expected from the National Guard

K-F Enlarges Facilities of Detroit Engine Div.

Kaiser-Frazer Corp. has increased the floor space of its engine division at Detroit by 23,000 sq ft. In the cylinder block department, working space has been practically doubled to 50,688 sq ft. In addition, 32 new machines have been added to the department bringing the total to 100.

DOES IT AGAIN

International News

Breaking the former record by about two miles, Mauri Rose streaked across the finish line in a Blue Crown Special at an average speed of 119.813 mph to win the 32nd International 500-Mile Race at Indianapolis for the second straight year. The final results of the racing classic were second, Bill Holland, Blue Crown Special, 119.147 mph; third, Duke Nalon, Novi Grooved Piston Special, 118.034 mph; fourth, Ted Horn, Bennett Bros. Special, 117.844 mph; fifth, Mack Hellings, Don Lee Special, 112.808 mph; sixth, Hal Cole, City of Tacoma Special, 111.587 mph; seventh, Lee Wallard, Iddings Special, 109.177 mph; eighth, Johnny Mauro, Mauro-Alfa-Romeo; ninth, Tommy Hinnershitz, Kurtis-Kraft Special; and tenth, Jimmy Jackson, Howard Keck Special.

NEWS *of the* AUTOMOTIVE INDUSTRIES

SHOWN IN THE BRONX

GM's Chevrolet Motor Div. took over the Kingsbridge Armory in the Bronx, New York, recently for this special equipment manufacturers show, which was reported to be the largest event of its kind ever held. About 150 equipment builders were represented in this commercial car exhibition.

British Austin to Export Sports Convertible

That the Austin Motor Co., Ltd. of England is in the American passenger car picture to stay was emphasized by Leonard P. Lord, chairman and managing director, in addressing the first nation-wide meeting of Austin dealers recently in New York City. Austin is establishing an additional spare parts depot on the West Coast, and now offers country-wide sales and service in the United States.

A new sports convertible to be presented toward the end of this year is expected to be somewhat larger than the current Austin, but still not as large as the average American car. Tapping the luxury market the first custom-built Sheerline is expected to reach the United States next month. Establishing a record for all imported automobiles by selling nearly 6000 British Austins in the United States in the past six months, Austin shipments to the United States average 1000 a month, with the expectation that this may be lifted to about 1725 a month by the end of the year. Austin production is only about 70 per cent of capacity right now, owing to critical shortages of various materials, such as steel, copper, leather, and lead for batteries.

Commerce Order Specifies Synthetic Rubber Use

The Commerce Department has revised its rubber order, R-1, to conform with the recently enacted Rubber Act of 1948. Principal feature of the revised order is the reversal of the specifications for the manufacture of tires, tubes, flaps and camelback from a maximum natural rubber basis to minimum synthetic rubber use. These changes do not alter the proportion of synthetic to be used in these items, but reflect the intent of Congress to assure consumption of synthetic in quantities sufficient to maintain the domestic industry. Accordingly, the order now specifies the use of a certain percentage of synthetic rather than the amount of natural, but makes no change in the amounts of synthetic and natural now being used.

To Hold British Air Show September 7-12th

Organized by the Society of British Aircraft Constructors, the annual Flying Display and Exhibition will be staged at the airfield of the Royal Aircraft Establishment, Farnborough, Hampshire, England from Sept. 7 to 12th.

No Steel for British-Made Gregoire Car

Steel allocations having been refused by the British Government, a second attempt to produce the French-designed Gregoire car on the British market appears to have been checkmated. Last fall, the Sterling Engineering Co., Dagenham, England, secured the manufacturing rights for Great Britain from the French designer, J. A. Gregoire, with the prospect of an allocation of raw material from the Ministry of Supply. This having failed to materialize, the automobile, popularly described as the "people's car," has had to be abandoned.

British Combine

BRITISH LAND ROVER

This four-wheel drive general utility vehicle, the Land Rover, is now being built by the Rover Co., England. Similar in general styling to the Jeep, it is powered by a four-cyl engine which develops 50-55 hp at 4000 rpm. It has an 80-inch. wheelbase.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Kaiser-Frazer Ships CKD Cars to India

Comprised of six packing cases containing parts for six automobiles, Kaiser-Frazer Export Corp.'s first shipment of CKD (completely knocked down) automobiles is en route to Motor House, Ltd., Bombay, India. Motor House, Kaiser-Frazer Export Corp. assembler and distributor in Bombay, has completed the construction of a new assembly plant near Bombay which can build 10 cars a day at capacity.

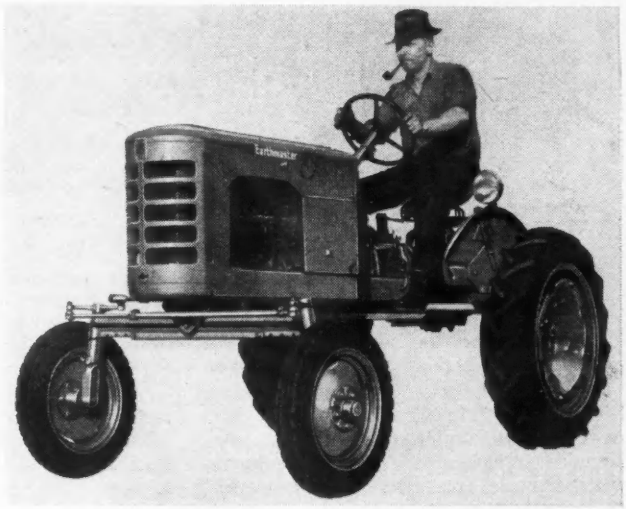
Tinnerman Int'l. Air Race At Cleveland, Sept. 4

A Tinnerman International Trophy Race, sponsored by Tinnerman Products, Inc., in which a minimum of five places will be reserved for non-American entries, will be held on Sept. 4 during the National Air Races in Cleveland.

Socony Expanding Refinery In Wyoming

With completion scheduled for next December, practically all phases of a general expansion and improvement program at the Socony-Vacuum Oil Co.'s refinery in Casper, Wyoming are now underway. Handling two types of crude oil from fields in Wyoming, products of this refinery include gasoline, kerosene, distillate heating fuels, tractor and diesel fuels, and asphalt. One effect of the program, which will double the refinery's current 3000 bbl-a-day capacity, according to Socony-Vacuum, will be to convert the refinery into one of the most modern and efficient in the United States.

FLEXIBLE TRACTOR

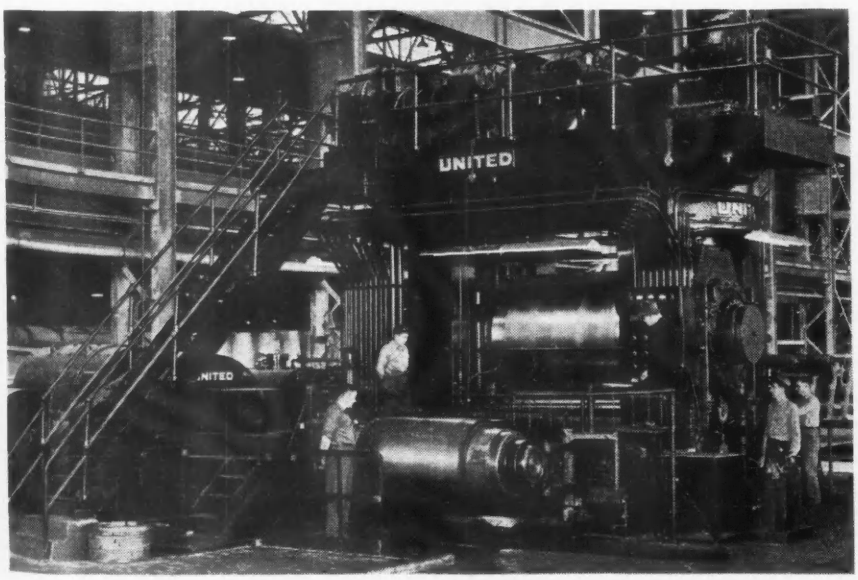


Manufactured by Earthmaster Farm Equipment at the Hollydale plant on the West Coast, this new tractor is designed for flexibility over a range of conditions. Minimum and maximum clearances of 18 to 24.5 in. are achieved by means of a movable rear axle housing which rotates on an off-center pivot point lowering or raising the vehicle three in.

Commerce Div. Expedites Automotive Exports

The Office of International Trade, Department of Commerce, has established a Transportation Equipment Div. to work with industry and other government agencies on the exportation of transportation equipment, including trucks, truck-trailers, buses, and parts. The new division is headed by Fred Glover, who directed the automotive division of WPB and who later was head of reconversion operations in the Civilian Production Administration.

One of the major tasks of this new division will be the granting of licenses for the export of trucks and other automotive equipment to Western Europe, under the European Recovery Program, as well as all other nations. In this connection, an automotive industry advisory committee is being set up to advise Mr. Glover of industry's views on the export of these commodities. Requirements for trucks under ERP are not yet firm, but it appears certain that not more than 50,000 will be needed over the next 12 months.



FAST SKIN PASSING

Representing a $1.5 million slice of a $20 million steel expansion program started by Ford Motor Co. in 1947, this new 84-in. skin pass mill is now in operation. Said to be one of the fastest wide skin pass mills in the country, the new mill will skin pass steel up to 78 in. in width, and can attain a speed up to 1350 fpm.

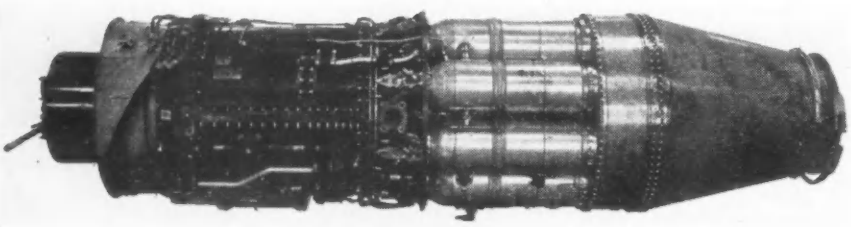
Export 74 Personal Planes In April

A total of 74 personal airplanes, four-place and under, valued at $363,432 were exported in April, the Aircraft Industries Association recently stated for the 12 reporting companies. Representing ten per cent of total production by number and 13.3 per cent of the dollar value for the same companies, these figures for April compare with exports of 47 planes valued at $227,451 reported by the same 12 companies for March. For the first four months of 1948, a total of 204 personal aircraft, four place and under, valued at $982,112 were exported.

A. F. Davis Welding Award for Undergraduates

Named for its donor, A. F. Davis, vice president and secretary of the

NEWS *of the* AUTOMOTIVE INDUSTRIES



POWER IN POUNDS

Now in production, General Electric's new torpedo-shaped TG-190 aircraft jet engine, also known as the Air Force J-47A, has a thrust rating of about 5000 lb. The TG-190 has now been installed as the powerplant of the North American F-86A, an Air Force fighter which has a reported speed of over 650 mph.

Lincoln Electric Co., Cleveland, the A. F. Davis Undergraduate Welding Award, consisting of four cash prizes, will be made annually to the authors and publications for the best and second best articles on welding in undergraduate publications during the preceding year.

New Non-Inflammable Hydraulic Fluids

The Naval Research Laboratory, Washington, D. C. has developed what is claimed to be the first successful non-inflammable hydraulic fluids, named "hydrolube" fluids, for use in airplanes. Coincidental was the compounding of a new polymer which was added to the original base of water and ethylene glycol to increase its density. The researchers were aided by the cooperation of several firms, notably E. I. duPont de Nemours & Co. in making the early formulations of water base fluid, and the Carbide and Carbon Chemicals Corp. in making the polymer.

States Tax 28 Billion Gal of Gasoline in '47

State gasoline taxes were collected on 28,407 million gallons of motor fuel during 1947, an increase of 2539 million gallons above that taxed during 1946, according to figures compiled by the Public Roads Administration. The average state gasoline tax per gallon for all states was 4.25c in 1947, as compared with an average tax of 4.16c in 1946. State gasoline tax rates last year ranged from two cents a gallon in Missouri to seven cents a gallon in Florida, Louisiana and Tennessee.

Automobile Casing Output Up 10% in March

Passenger car casing output was 10.4 per cent higher in March than in February while truck casing production dipped 1.1 per cent in March as against the preceding month, according to the Rubber Manufacturers Association, Inc. The RMA also disclosed that consumption of rubber by domestic manufacturers in March amounted to 92,359 long tons. This compares with 86,387 long tons in February and 101,177 long tons in January of this year.

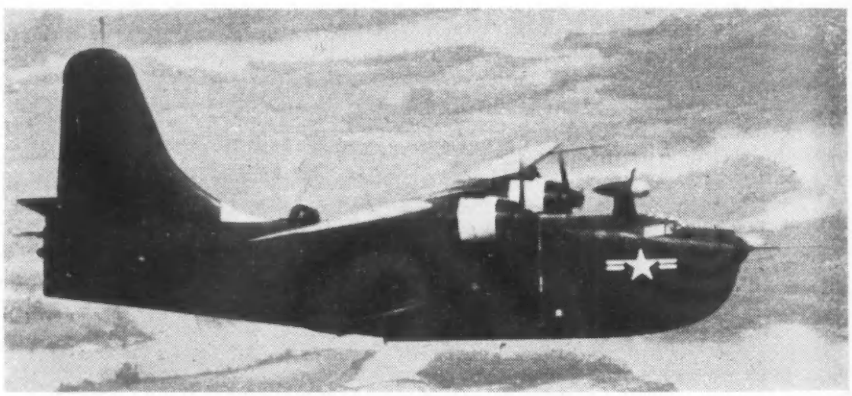
Passenger car casings produced in March totaled 5,640,221 against 5,109,722 in February, and truck casings produced were 1,261,424 against 1,275,672 the previous month. Shipments of passenger car casings also increased, March shipments totaling 4,555,303, while the February total was 4,016,756. Truck and bus casing shipments were up to 1,147,352 units, against 1,089,579 the previous month. Both production and shipments of automotive tubes showed increases over the previous month with production up 11 per cent and shipments up 15 per cent.

Lockheed Checks Tests With Camera and Grid

The Lockheed Aircraft Corp. is using a special wire grid and motion picture camera, located on top of a 45-ft hanger at its factory in Burbank, Calif., to check the takeoff and landing performance of all Lockheed experimental airplanes. The equipment consists of a curved grid of vertical and horizontal wires nine ft high and 64 ft long with a special motion picture camera placed 20 ft behind the wire screen. A 4¼-in. telescopic lens is focused on the airplane at between 1800 and 2000 ft away. When the camera picks up a sharp image of the airplane on the runway, the numbered grid wires and a timing tape are also in focus. The device permits accurate mathematical determination of an airplane's takeoff and landing characteristics.

Automobile Old Timers Move Headquarters

Providing the organization which has now grown to a membership of 3000 with more space, the new national headquarters of the Automobile Old Timers, organization of pioneers of the automobile world, were moved on June 1, to the Midston House, New York City, Frederick H. Elliott, secretary, disclosed recently.



EXPERIMENTAL PATROL

The chief design features of this new Martin XP5M-1, an experimental model of a new Navy twin-engined patrol flying boat which recently completed its initial flight test, are its long "after-body" hull, and its large single vertical tail. It is powered by two Curtiss-Wright R-3350 engines developing 2700 hp each.

U. S. Spring & Bumper to Expand Plant

The United States Spring & Bumper Co., Los Angeles, will invest $1 million during the current year in new plant facilities and equipment. Manufacturing automobile springs and bumpers, the company recently leased an additional building of about 40,000 sq ft.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Lighten Restrictions on GR-S Synthetic Rubber

A new amendment to Rubber Order R-1 now paves the way for a better supply of natural rubber inner tubes for consumers in areas where butyl tubes have been found to be affected adversely by low temperatures or other conditions. Under the revised order, maximum inventory restrictions on general purpose synthetic rubber (GR-S) are removed. Since early this year, inventories have been held to amounts sufficient to produce not more than a 20 day supply. It also broadens the base of mandatory use of butyl (GR-1) to include medium-size and bus inner tubes without requiring additional total use of synthetic material. In announcing the change, H. B. McCoy, director of the Office of Domestic Commerce, said that GR-S will remain under allocation although he believes production is sufficient to allow accumulation of normal inventories by tire manufacturers.

New British Bus Features Independent Suspension

The first British bus to be built with independently sprung front wheels has been produced by the Birmingham and Midland Motor Omnibus Co., England, on a Midland Red chassis. The suspension is of transverse wishbone type, with arms of unequal length and double coil springs. Incorporated in the design is a Woodhead-Monroe double-acting hydraulic shock absorber. The standard frame members have been reinforced by an internal gusset plate in order to take care of the greater concentrated load.

To Hold Paris Car Show October 7-17th

All American passenger car manufacturers have reserved space in the Paris automobile show, to be held from Oct. 7-17, covering passenger cars, trucks and equipment. Newcomers in the truck section are Mack and White. There will be a London truck show from Oct. 1-9, followed by the passenger car exhibition at Olympia, Oct. 28-Nov. 6

Form Int'l. Air Race Group in Southern California

The Southern California International Air Races, Inc., a non-profit organization, was formed recently under the sponsorship of the Southern California chapter of the National Aeronautic Association.

Mazey Is Hazy

Over a week before the wage agreement was reached May 25 by General Motors and the UAW-CIO, Acting President Emil Mazey of the UAW, according to newspaper reports, told a regional union conference in Philadelphia that the Chrysler strike was the most important strike in 1948 and that it would set the wage pattern for the entire automobile industry and for the balance of the labor movement.

Commenting on the GM dispute, he charged that GM could afford a 50 cents per hour increase and that it could reduce car prices by $150 and still make six per cent profit. The UAW settled with GM for 11 cents an hour.

Texas Company to Build Farm Tractors

A report from Dallas, Tex., states that the Intercontinental Mfg. Co. of that city has completed arrangements with Texas Engineering and Mfg. Co. for the assembly of farm tractors. The unit is said to be a 26-hp all-steel frame tractor. Production goal for this year is 2000 units, with eventual output 6000 a year.

Ferguson Gets Sales Rights for Corn Harvester

Harry Ferguson, Inc. has acquired the exclusive distribution rights for a corn picker manufactured by the Belle City Mfg. Co., Racine, Wis. Large scale production of the machines is scheduled to start immediately. The Ferguson organization currently has under construction a large new plant in Detroit.

Tire & Truck Output Low In Western Germany

Tire and truck production in the western zone of Germany are both still far behind prewar levels. A recent report indicated that in the whole western German industrial zone, 170 plants are producing tires, employing 40,000 workers. In February of this year they reached the highest production since the war with an output of 123,000 tires. However, prewar capacity has not nearly been reached as in 1938 all of Germany produced 750,000 tires a month, which would mean about 400,000 tires for the Western part of Germany.

There is a definite need for trucks for Western Germany amounting to 50,000 units a year. Actual production in 1947 was only 8000, and even if in 1948 the intended production of 39,688 trucks is achieved, there will still be a shortage. The situation, however, should be radically improved as a result of an agreement between General Clay and Dr. Köhler, president of the German Economic Staff, providing for the delivery of 300,000 U. S. Army surplus trucks.

Annual Meeting of Foremen Group in Philadelphia

The National Association of Foremen will celebrate its 25th Anniversary during the annual NAF Convention which will be held in Philadelphia from Sept. 23rd to the 25th.

(*Turn to page* 85, *please*)

SHIPMENT OF COMPLETE AIRCRAFT AND AIRCRAFT ENGINES AND OTHER PRODUCTS OF THEIR PLANTS, 1948*

AIRCRAFT

	March	Three Months
Complete Aircraft	863	2,096
Military Aircraft		
Number of Planes	278	573
Civil Aircraft	585	1,523
Personal Planes		
Number	571	1,482
Value	$2,522,326	$6,726,281
Transport Planes		
Number	14	41
Value	$4,645,975	$10,138,592
Aircraft Parts—Value	$1,688,716	$5,652,099
All Other Products—Value	$2,918,653	$8,773,962
Total—Value of All Products	$11,775,670	$31,290,934

AIRCRAFT ENGINES

	March	Three Months
Military Engines		
Number of Engines	379	1,021
Value of Engines	$18,645,230	$50,824,716
Value of Parts	$6,248,021	$13,459,128
Civil Engines		
Number of Engines	1,093	2,879
Value of Engines	$2,872,478	$9,583,750
Value of Parts	$2,302,297	$5,692,955
Total—Engines	1,472	3,900
Total—Value of Engines	$21,517,708	$60,408,466
Total—Value of Parts	$8,550,318	$19,152,083
All Other Products—Value	$89,527	$231,673
Total—Value of All Products	$30,157,553	$79,792,222

*—Bureau of the Census and Civil Aeronautics Administration

"F.O.B." Detroit under S

BROUGHT to a head by the recent Supreme Court decision outlawing the basing point system of pricing as practiced in the cement industry, the long-term trend toward Government control of marketing practices, principally by the Federal Trade Commission, appears to pose significant problems for the automobile manufacturing industry. The effect on the industry's buying practices will be direct, particularly if the Federal Trade Commission is successful in its current attempts to wipe out the basing point system of pricing in the steel industry. This result is expected by FTC after a long court battle. On the other hand the automobile industry's selling practices also may be affected in an indirect, but nonetheless important, manner.

Briefly, the Supreme Court's decision in the cement case outlawed the basing point system of pricing and any systematic absorption of freight by cement producers. FTC does not interpret it as forcing the adoption of a uniform f.o.b. mill system of pricing, but emphatically states that a mill price will have to be established for cement at each producing point. The industry will have to sell f.o.b. mill when requested. Applying this decision to the steel industry and others where the cost of freight is a major price factor, as the Commission is confident will be done, will mean a major change in the buying habits of the automobile industry. FTC attorneys and economists maintain that such a change would be beneficial to automobile producers, since it is claimed it will result "in more competition in the selling of steel and eventual lower prices." It is further claimed that with the steel industry selling f.o.b. mill when requested automobile producers will be able to "take factory delivery and utilize cheaper water and truck transportation."

Indicating the possible scope of the decision, one member of the Federal Trade Commission, Lowell Mason, recently pointed out that the Government can be expected to attack the pricing system of those heavy commodities where the freight is a large percentage of the cost of the article to the purchaser. Commissioner Mason included in this category commodities such as: automabile parts, rubber, builder's supplies, farm equipment, road machinery, paint and varnish, reinforcing materials, antifriction bearings, construction machinery, and many others.

It can readily be seen, therefore, that the possible effect on the buying practices of the automobile industry is of tremendous proportions. In addition, other segments of the automotive industries, such as producers of farm machinery, etc., are likely to find their present selling methods under fire.

Beginning with the Corn Products and Staley cases in 1946 and more reecntly the Cement case decision, the Federal Courts have placed the Government squarely into the marketing picture, turning over to an administrative agency the authority to determine what are lawful selling methods.

While the effect of these decisions on the buying practices of the automobile manufacturing industry seems reasonably clear, one must look to another section of the Court's ruling for the possible effect on the industry's selling methods. In this connection, FTC points out that perhaps the most important effect of the Cement decision was that it "revitalized the authority of the Federal Trade Commission." In backing up this interpretation, which industry attorneys agree is correct, FTC makes much of the fact that in all cases of fact the Supreme Court relied heavily on Commission findings. For example, many of the Court's conclusions are preceded by phrases such as the following: "We sustain the Commission's holding. . . . In so doing we give great weight to the Commission's conclusion. . . . We uphold the Commission's conclusion. . . ."

Along these lines, the Court stated that it was the intention of Congress to

The Benefits of Competition

Active competition among automobile manufacturers, although some of them have made very large profits, gave to the public improved products, often at substantially reduced prices. In the automobile industry this has been especially true of those manufacturers who are able to obtain large volume of production through competitive improvement in motor-vehicle construction, style, performance, and safety, particularly in the low-priced class. Such competition has been the basis for the remarkable growth of the industry.

Consumer benefits from competition in the automobile-manufacturing industry have probably been more substantial than in any other large industry studied by the Commission.—*From Federal Trade Commission's 1939 Report on Motor Vehicle Industry.*

Scrutiny Again

If Decisions in Cement Industry Case Outlawing Basing Point System of Pricing and Morton Salt Case Affecting Quantity Discount Schedules Are Found Applicable to Automobile, Steel and Other Industries, They May Result in Extensive Changes in Company Marketing Practices

By Eugene J. Hardy,
Washington Bureau, AUTOMOTIVE INDUSTRIES

create an agency "whose membership would at all times be experienced, so that its conclusions would be the result of an expertness coming from experience. We are persuaded that the Commission's long and close examination of the questions it here decided has provided it with precisely the experience that fits it for performance of its statutory duty."

This decision on the part of the Court to bow to the Commission's findings has brought about a realization that the FTC has become one of the most powerful bureaus in Washington, provided adequate appropriations are made by the Congress. There is little doubt that the courts will go slow before disturbing FTC orders in future cases in view of the Court's reversal of its 1922 opinion regarding the authority of the Commission.

It is this revitalization of the Commission's authority which might bring headaches to the automobile industry regarding its methods of selling cars and trucks. Despite the fact that the Commission has used the automobile industry's f.o.b. factory method of selling as an example of the method in a big industry that it would like to establish in the steel industry, the Commission is beginning to take a closer look at the industry's current selling practices. In the early days of the industry when Detroit became the center of automobile manufacturing, "F.O.B. Detroit" became symbolic of the method used by the various companies in and outside Detroit of advertising their vehicle (*Turn to next page please*)

The Benefits of Bigness and the Cement Case Decision

By Walter S. Tower, President
American Iron and Steel Institute

ONLY bigness could do the job which this industry did for the war during the years 1940 through 1945. Only bigness could make the record for steel which was set last year. Only bigness could hold out any hope of doing for world economic recovery what your companies are expected to do this year and next and next.

If this country wants steel in its modern efficiency it must accept bigness. If it rejects that bigness, it rejects the main prop of this country's economic strength and World influence. Yet here comes the highest court with an opinion which if carried over into this industry could mean only confusion and difficulty for both makers and users of steel. It could mean the end of bigness in industry. I refer to the matter of basing point pricing as involved in the Cement case decision. The first attack on the basing point method of quoting prices was begun 29 years ago by a group of western steel consumers, who had a novel idea that if they could buy steel cheaper they could make more money. That attack opened the way for a continuing crusade by economic zealots, who dwelt mentally in the realm of pure theory and worshipped the ancient idol of seller and buyer higgling in the market place.

In 1919 there were only 7½ million automobiles registered in this country. Today there ars five times that number. In 1919 the average person knew little, if anything about mechanical refrigerators, electric washing machines, kitchen ranges, etc. Today more than 20 million homes are so equipped and output last year was at new high levels, with close to a score of well-known makes in the market.

Few of these products, now such large factors in comfortable living, are made at basing points for steel products or even close to steel mills. Less than half of the automobiles come out of Detroit assembly plants. Most of the widely known refrigerators come from places which make no steel. And much

(*Turn to page* 68, *please*)

prices f.o.b. factory. In later years when some companies established branch assembly plants and modes of transporting vehicles increased, they continued the "f.o.b. factory" price policy. Now there is some change from the original practice with establishment by certain companies of zone prices which have very little relationship to the old factory freight charges. Zone prices are an attempt to have the care more nearly reflect its share of the freight burden on the components that go into it, plus plant overhead and other costs of doing business at branch assembly plants.

This situation brings to mind the Commission's 1939 report on the motor vehicle industry in which Congress was told that "the frequent practice of either motor vehicle manufacturers or dealers of adding to the factory price a transportation charge to a certain point of delivery based on the published railroad rate, but which is greater than that actually incurred by the manufacturer or dealer, because of differing methods of transportation and delivery, is, in the opinion of the Commission, an unjustifiable imposition upon the purchasers of such vehicles, which should be eliminated."

A recent check by AUTOMOTIVE INDUSTRIES revealed that Commission officials have not changed their views regarding the alleged practice. They also look unfavorably on the practice of charging ultimate purchasers rail freight from the home factories on vehicles built at branch assembly plants from parts and assemblies shipped to them.

While it is admitted there is no evidence of conspiracy or restraint of competition in these alleged practices, FTC feels that there is a possible harmful effect to the ultimate purchaser of vehicles. For example, one FTC attorney posed this question to AUTOMOTIVE INDUSTRIES: "Is the automobile industry passing along to the consumer all savings realized in transportation by the use of these methods?"

Continuation of the present trend of Government control of marketing methods might well result in the establishment of an f.o.b. price at each automobile assembly plant, according to these sources. Summed up, one FTC official told AUTOMOTIVE INDUSTRIES that this trend "definitely warrants the automobile industry looking into its current practices to determine whether they are violating the law."

What then might be done to halt this trend which appears to have such far-reaching effects? Action by Congress seems to present the most logical solution. Remedial legislation (*Turn to page* 68, *please*)

FTC Now Studying Quantity Discounts of Automobile Parts and Tire Industries

THE recent Supreme Court decision in the Morton Salt case, which banned what the Federal Trade Commission describes as "unjustified quantity discounts", is under careful study by the FTC to determine its effect on the automobile parts and tire industries. The Court ruled that the FTC is authorized by the Clayton Act "to bar discriminatory prices upon the 'reasonable possibility' that different prices for like goods to competing purchasers" may have the effect of substantially lessening competition or injuring, destroying or preventing competition. The Commission need not show actual injury to competition under the Court's ruling.

The Commission had found that Morton's quantity discount schedule and certain other discounts granted to some purchasers were unlawfully discriminatory. It held that these quantity price differentials were not shown to be justified by reason of differences in the cost of manufacture, sale or delivery resulting from the differing methods or quantities in which its salt was sold or delivered, and that other "special" discounts were not made in good faith to meet a competitor's equally low price. The Court cited the following quantity discount practices:

Respondent (Morton Salt Co.) manufactures several different brands of table salt and sells them directly to (1) wholesalers or jobbers, who in turn resell to the retail trade, and (2) large retailers, including chain store retailers. Respondent sells its finest brand of table salt, known as Blue Label, on what it terms a standard quantity discount system available to all customers. Under this system the purchasers pay a delivered price and the cost to both wholesale and retail purchasers of this brand differs according to the quantities bought. These prices are as follows, after making allowance for rebates and discounts:

	Per Case
Less-than-carload purchases	$1.60
Carload purchases	1.50
5000-case purchases in any consecutive 12 months	1.40
50,000-case purchases in any consecutive 12 months	1.35

Only five companies have ever bought sufficient quantities of respondent's salt to obtain the $1.35 per case price. These companies could buy in such quantities because they operate large chains of retail stores in various parts of the country. As a result of this low price these five companies have been able to sell Blue Label salt at retail cheaper than wholesale purchasers from respondent could reasonably sell the same brand of salt to independently operated retail stores, many of who competed with the local outlets of the five chain stores.

Respondent's table sales, other than Blue Label, are also sold under a quantity discount system differing slightly from that used in selling Blue Label. Sales of these other brands in less-than-carload lots are made at list price plus freight from plant to destination. Carload purchasers are granted approximately a five per cent discount; approximately a 10 per cent discount is granted to purchasers who buy as much as $50,000 worth of all brands of salt in any consecutive twelve-month period. Respondent's quantity discounts on Blue Label and on other table salts were enjoyed by certain wholesalers and retailers who competed with other wholesalers and retailers to whom these discounts were refused.

In addition to these standard quantity discounts, special allowances were granted certain favored customers who competed with other customers to whom they were denied. One such customer, a wholesaler, received a special discount of 7½ cents per case on purchases of carload lots of Blue Label Salt. Respondent sold to this wholesaler at $1.42½ per case, although competing wholesalers were required to pay $1.50 per case on carload lots.

The Supreme Court held, in the majority opinion written by Justice Black, that the Commission was justified in finding that "the competitive operations of certain merchants were injured when they had to pay respondent substantially more for their goods than their competitors had to pay."

Another ruling was to the effect that price differentials which would otherwise constitute unlawful discriminations in price are not exempt from the

(*Turn to page* 70, *please*)

Organized Labor's Monopolistic Power Must Be Curtailed

By Donald R. Richberg

THE simple fact that a free government can be sustained only by a free economy is often forgotten, but never successfully ignored. It is the inevitable tendency of human beings who enjoy the possession of a little power to seek to enlarge it steadily toward that ultimate illusion of absolute control. Competition is a stimulating, but also a tiresome factor in making a success of one's work. Competition is the life of trade, but may cause the death of a trader. So the desire to eliminate what is apparently "destructive competition" is natural, and therefore any free government which is supportable only by a free economy, must be eternally vigilant to prevent and destroy private monopolies.

There is no easy escape from this obligation by undertaking public ownership or public regulation of monopolies. Some natural monopolies can wisely be excluded from the area of free enterprise and be state owned, like the postal service, or can be state regulated like telephone, electric and gas service. But, to preserve a free economy, the vast area in which goods and services are produced and distributed for common use must be kept free from detailed political regulation and subject to the automatic regulation of a real competition to satisfy consumer demands in an open market.

With the best intentions and large appropriations the national government cannot prevent all monopolistic practices by business men, any more than a competent police force can prevent all automobile accidents or robberies or embezzlements. In order to maintain a genuine competition as the regulator of production costs and selling prices, we must rely mainly, not on the public prosecution of monopolists but on willing obedience to anti-monopoly laws by private business managers. Those who do not already know this, should be educated to understand that the elimination of monopolistic practices is just as essential to the life of private enterprise as the elimination of dishonesty and fraud in dealing with customers and investors.

It is an extraordinary development that today the most conspicuous and effective monopolists regulating the production costs, and thereby the selling prices, of American products are not the managers who represent ownership, but those representatives of organized labor who have become in fact business regulators with great authority.

We cannot place these labor leaders on a list of law-breaking monopolists, however, because, through a series of political blunders our national laws provide, first, that labor union monopolies can be lawfully organized, and second that monopolistic controls of industry and trade by labor unions are lawful.

Nevertheless, we should point out that labor leaders are blinded by self-interest and unfaithful to their free citizenship when they resist laws enacted to destroy their monopolistic powers. If these are not destroyed, they will in the end themselves destroy a competitive economy which is the only economic system in which labor can be free.

Two opposing types of unfaithful citizens, are unwilling to rely solely upon lawful procedures to accomplish their aims. Both are ready and willing to resort to mob rule when they cannot gain their ends by peaceful, orderly methods.

At one extreme we have those who orgaize secret societies and vigilance committees, either to prevent the enforcement of laws or to take law enforcement into their own hands.

At another extreme we have those who openly organize mass picketing and gangster methods of intimidating persons who will not support the policies or submit to the discipline of labor unions.

So long as organized labor was struggling for existence, so long as the arbitrary use of money power seemed to justify the militant use of man power, so long as the law protected economic coercion by employers and restrained economic coercion by employees, the lawlessness of labor organizations had the excuse, if not the justification, of apparent necessity.

We can understand the reluctance of labor leaders now to lay aside any of the weapons with which they have waged a successful warfare to obtain the power of self-protection and self-advancement. But, the abuses of this labor pow- (*Turn to page 82, please*)

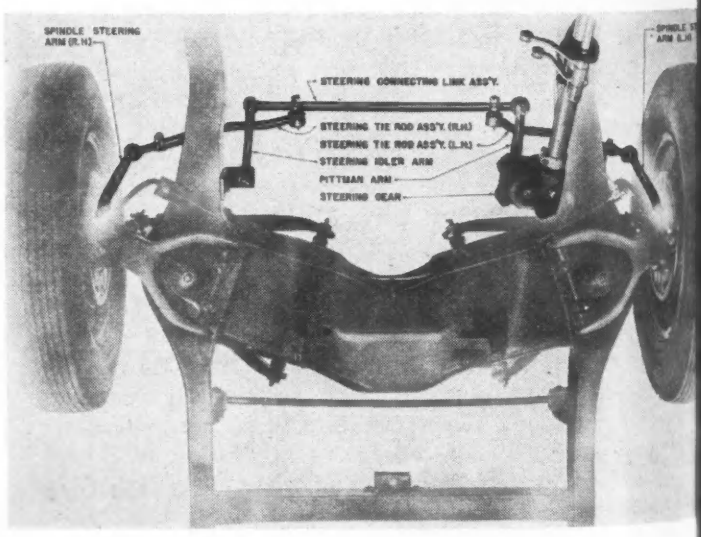
New Body + Completely

Typical of '49 Ford styling is this four-door sedan with its full width body.

SWEEPING changes in styling and mechanical design as basic and as dramatic as the shift from the Model T Ford in the late '20's characterize the 1949 Ford line introduced recently. Unique styling treatment distinguishes Ford models from their big brothers—Mercury and Lincoln, provides exceptional seat width both front and rear. The standard wheelbase of 114 in. is continued.

Mechanically the new Ford has features of intense interest since they all mark a complete break with traditional Ford engineering. Spring suspension is completely new all around with coil spring independent suspension at the front and longitudinal leaf springs at the rear. The steering linkage too is different. Torque tube drive has gone by the board with the introduction of Hotchkiss drive. This, in combination with a hypoid gear rear axle and a long extension on the transmission, permits use of a shorter one-piece propeller shaft with less drive shaft tunneling.

A radical change in weight distribution is effected by moving the body forward five inches so that the rear seat is ahead of the rear wheelhouse and the engine moved forward correspondingly. This change gives front seat hip room of 61.5 in. and shoulder width of 57.2 in.; and a rear seat hip width of 60 in.

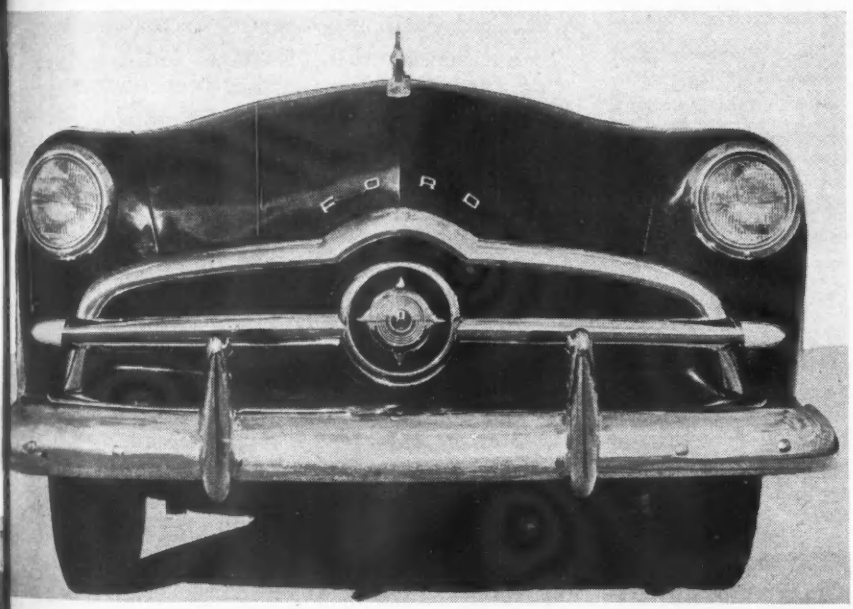


Ford's new steering linkage layout which is said to minimize road shock and permit easy crosswind steering.

New Chassis Equals New 1949 Ford

Sweeping Changes in Chassis Design Include Independent Coil Spring Suspension at Front, Hotchkiss Drive, Hypoid Gear Rear Axle, New Frame and Longitudinal Leaf Springs at Rear. Engine Has Improved Accessory Location and "Equa-Flow" Cooling System. Better Weight Distribution with Body Mounted Farther Forward.

By Joseph Geschelin



Simplicity is accentuated in the design of the grille, which serves as an air scoop for the new heating and ventilation system.

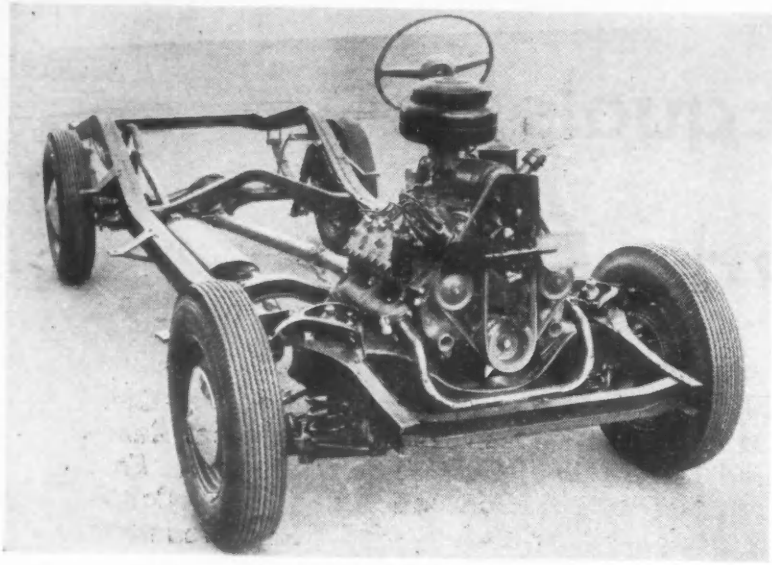
The improved versions of the Ford Six and V-8 engines offered in the line have the same basic features as described in connection with the Ford truck announcement (see AUTOMOTIVE INDUSTRIES, Jan. 15, 1948), except for the normal differences in the passenger car engines. The brake system is of new and improved type, using drums of smaller diameter but with increased lining area, with greater capacity at the front to accommodate the change in weight distribution. Finally the new running gear elements are assembled in a chassis frame of advanced design having box section side rails of welded construction.

Coming to the engines, the 95-hp Six and 100-hp V-8 have the improved features described in connection with the truck models, major differences for passenger cars being a new type of mounting, a different oil pan, and a different exhaust manifold cross-over arrangement. Fuel economy is said to be increased by 10 per cent with the introduction of a new intake manifold giving better fuel distribution, and so mounted that it is parallel with the ground line. This reduces the tendency for raw mixture to flow to the rear cylinders. Improvement in the ignition system, principally the adoption of full vacuum control of spark advance—eliminating mechanical governor actuation—also contributes to improved economy. The distributor now has only a single breaker arm.

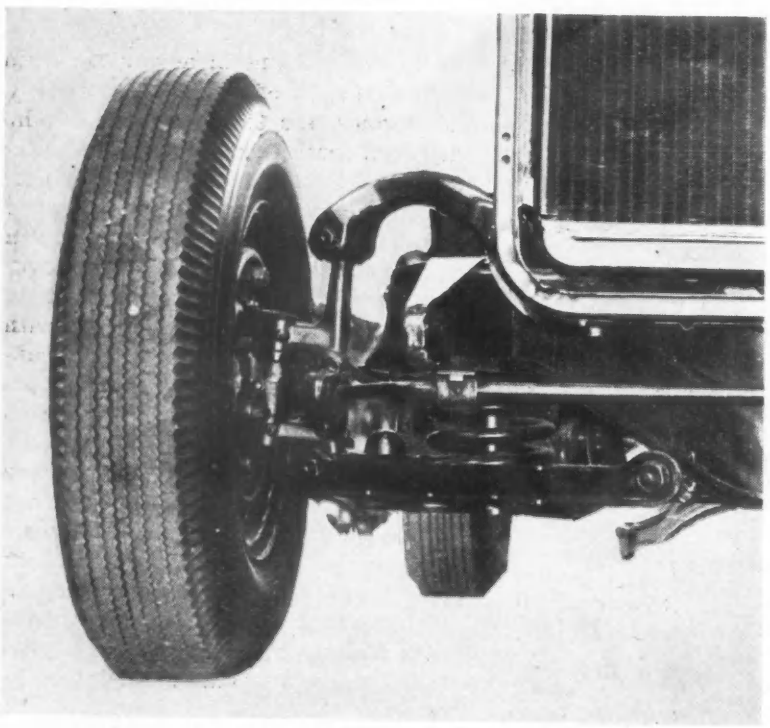
Compression ratio is 6.8 to 1. As described earlier, the crankshaft for the V-8 is heavier than before, with larger main bearings, and with sludge traps drilled for each rod bearing.

The new engine mounts are specially designed to minimize transmission of engine vibration to the chassis. The elements of the Hotchkiss drive also combine to prevent transfer of road noise and vibration into the chassis. A Long semi-centrifugal clutch with Torbend disk fitted with a spring type vibration damper is standard equipment. Speaking of fuel economy, Ford offers an overdrive as a factory-installed option claimed to give as much as 25 per cent additional economy.

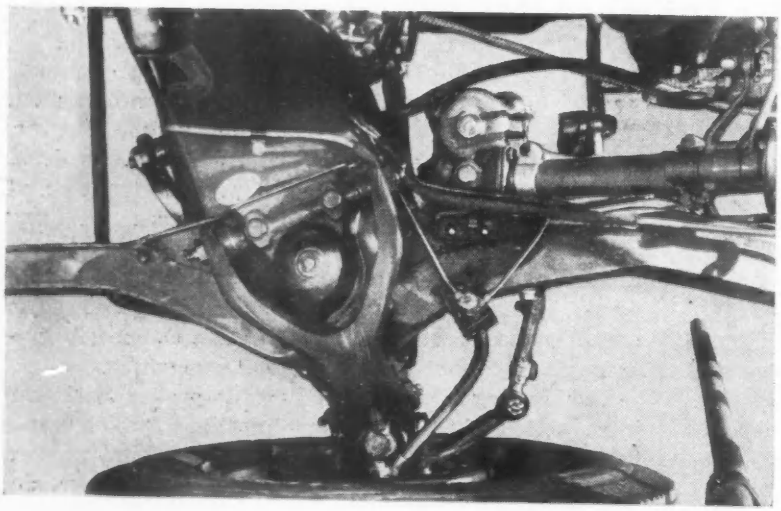
The cooling system has been improved with the introduction of the "equa-flow" design in which water flows the full length of the block. Temperatures in normal hot spots in the Six and V-8 have been de-



The completely new chassis for 1949 Fords.



Closeup of Ford independent wheel suspension design that features mounting of direct acting shock absorber within coil spring.



Top view of steering gear mounting and upper control arm of independent front suspension.

creased as much as 12F, thus contributing to better performance under extreme operating conditions. The V-8 has water pumps of increased capacity.

The independent front suspension, having "hydra-coil" springs, replaces the time-honored transverse spring and front axle. In this design the direct-acting shock absorbers are mounted within the low frequency coil springs, thus simplifying the layout. The layout is said to have been developed meticulously to effect the most favorable geometry, the pressed steel upper and lower arms being mounted to the front cross member. Threaded bushings are used in this linkage.

At the rear, the traditional transverse spring has been replaced by two semi-elliptic longitudinal springs, 50 in. long and two in. wide, shackled at the rear. The springs are fitted with inserts to prevent inter-leaf contact and thus assure controlled and consistent spring action. Shackles and spring eyes are fitted with compression type rubber bushings. Direct-acting shock absorbers at the rear are mounted diagonally fore and aft. With this radical change in suspension, it is possible to use just one stabilizer bar—at the front—and of smaller size than before.

Steering geometry has been improved greatly by the adoption of a parallel link layout which is said to minimize road shocks and permit steering with ease even in severe cross winds.

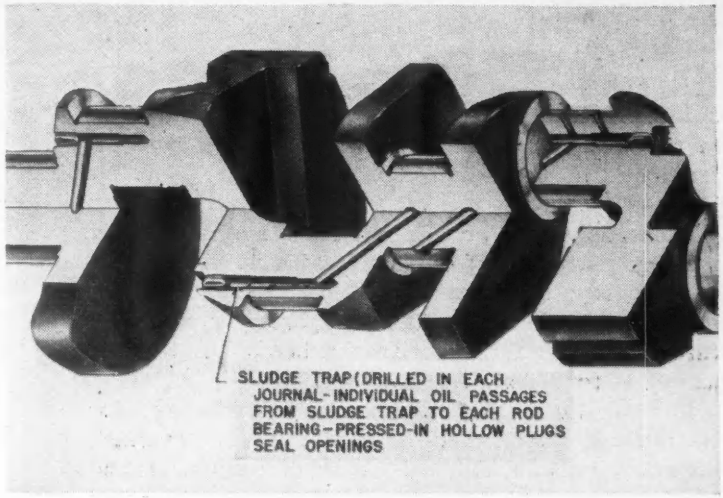
Adoption of Hotchkiss drive comes hand in hand with the introduction of a semi-floating hypoid rear axle, having a two-pinion differential, and a reduction of 3.73 to 1 as standard. Other ratios are available for special operating conditions. For example a ratio of 4.10 to 1 is used when overdrive is specified, the same ratio being supplied for mountain drive. The axle shaft has a flanged end which eliminates the conventional rear hub, the wheel being attached directly to the flange.

Among the major changes in mechanical specifications is the brake system. Ford now uses Bendix hydraulic duo-servo brakes of floating anchor type, with molded linings. Whereas the discontinued models had 12 x 1¾ in. brakes all around, the 1949 models have 10 x 2¼ in. front, and 10 x 1¾ in. rear;

with a 1⅛ in. wheel cylinder at the front and ⅞-in. at the rear. Lining area of the 1949 brake system is 177 sq in. as compared with 162 sq in. heretofore.

The new body is distinctive in lines and must be seen to be appreciated. Skillful design, combined with the forward shifting of the body, has permitted a decrease in body width to 71.7 in., maximum, and yet provides front seats six inches wider and rear seats nearly eight inches wider. A 56-in. tread front and rear is used instead of 58 and 60-in. respectively in older models.

A new car heating system is available, featuring fresh air scoops from large intakes just behind the grille. With automatic temperature control this system can be used as a fresh air ventilator, a fresh air heater, or a recirculating heater. The windshield has been increased in height and width while the rear window is increased substantially in area. All doors hinge at the front, the inside door handles being arranged to push up instead of down both features combining to preclude accidental opening of doors.


SLUDGE TRAP (DRILLED IN EACH JOURNAL - INDIVIDUAL OIL PASSAGES FROM SLUDGE TRAP TO EACH ROD BEARING - PRESSED-IN HOLLOW PLUGS SEAL OPENINGS

Rod bearings are provided with sludge traps as shown by this sectional view of the heavier V-8 crankshaft.

COMPARATIVE FORD SPECIFICATIONS

(Four-door Sedan)

	1948	1949
Wheelbase (in.)	114	114
Curb Weight (lb)	3414	3175
Overall Length (in.)	196.08	196.75
Maximum Width (in.)	73.25	71.7
Height-Loaded (in.)	66.15	62.75
Tread—Front (in.)	58	56
Rear (in.)	60	56
Engine Displacement (cu in.)	V-8—Six 239 226	V-8—Six 239 226
Horsepower	100 90	100 95
Brake—Type	Hydraulic	Hydraulic
Front Spring	Transverse Leaf	Independent Coil
Rear Spring	Transverse Leaf	Longitudinal Leaf
Drive	Torque Tube	Hotchkiss
Rear Axle	¾ Floating Spiral Bevel	Semi-Floating Hypoid
Differential	4-Pinion	2-Pinion
Tire Size	6.00—16	6.00—16
Front Seat Hip Room (in.)	55.3	61.5
Front Seat Shoulder Width (in.)	54.25	57.2
Width of Body at Center Pillar (in.)	55.6	61.0
Rear Seat Hip Room (in.)	51.5	60.0

The 1949 models are offered in two lines—Ford and Ford Custom—body types in both including a four-door sedan, a two-door sedan, and a club coupe. Convertible and station wagon models are available only in the Custom line; while the three-passenger coupe is found only in the Ford line.

The station wagon has a number of distinctive features, the most important being the elimination of rear doors and enlargement of the two front doors. This construction is designed to prevent squeaks and rattles, ruggedness being achieved by transferring all body stresses into the all-steel body. For additional strength and safety, station wagons have a special X-type frame. The station wagon seats eight and permits easy loading of baggage without opening the end-gate at the rear. Two rear seats may be removed to permit carrying larger loads. In addition to the end-gate, the station wagon also has an easily-operated lift-door at the rear.

Among the many items of optional equipment offered in the line are turn signals, and super-balloon tires mounted on 15-in. wheels, offered at extra cost.

New Stabilizer for Double-Deckers

A MODIFICATION which has improved the riding and cornering qualities of Leyland Titan doubledecker vehicles on trial service is now being introduced as standard on all home and overseas Titan models.

Shock absorbers are being omitted, and instead a new torsion tube stabilising device which restricts lateral roll is being fitted. A patent for the present device is pending in the name of Leyland Motors Ltd. and Mr. Norman Tattersall, the company's research engineer.

In the new design the torque tube forms a longitudinal connection between the rear axle and the tubular cross-member immediately forward of it. Each end of the tube is secured in a sturdy torque arm. Both ends of each torque arm are located in easily replaceable pre-loaded rubber bushings. The arms are dependent from and strapped to the axle and cross-member.

It will be appreciated (*Turn to page 78, please*)

Bath New

EXTENDING the contributions of parts makers in the automotive industries is a unique service offered by The Cyril Bath Co., Cleveland 8, Ohio. It is a new technique in metal forming, termed the Bath Contour Forming process designed specifically for making parts and formations difficult to produce economically by conventional methods. The company already is supplying such parts for manufacturers of bodies for motor trucks, buses, and trailers, as well as for the aircraft industry.

Contour forming is recommended particularly for the difficult curved parts required in small lots which do not justify investment in press equipment and special dies; for parts which cannot be produced readily by conventional press equipment or are too large to be accommodated in available press equipment. It is obvious that the Bath process is not intended to compete with conventional press equipment or techniques. On the contrary its place is in the making of parts which cannot be produced by conventional means or where the runs are too small to justify investment in costly tools.

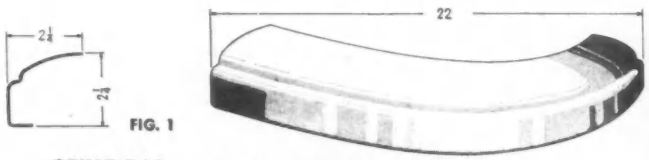
Fortunately, too, contour forming lends itself most readily to the shaping of aluminum alloys and copper alloys in extruded forms of the most complex character; stainless clad materials; and the stainless and high tensile steels which do not lend themselves readily to fabrication in press dies.

The ability to form extruded shapes into useful curved members for the structure of large bodies offers the designer unusual freedom in the selection of suitable cross-sections not only from the standpoint of strength and rigidity but in pleasing lines as well. The technique, therefore, gives the designer full freedom without fear of freezing the design since the contour forming method lends itself readily to change.

To be more specific the company is currently producing typical parts of the following description: Large bumpers, rub rails, roof rails, roof ribs, body posts, channel frames, decorative molding, tube frames, window frames, body structural members such as one-piece side post and roof rails, fifth wheel rings, wheelhouse angles, etc. In addition, some recent work proves the feasibility of producing simple flanged fenders and fabricated radiator grille sections.

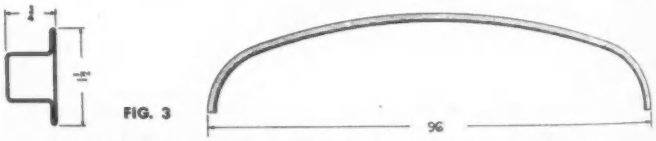
(Right) Another aspect of flexibility—stressing the variety of useful structural materials—is found in this view.

(Below) Entire sections of a bus or truck cab structure can be made in a single formation of any required cross-section by the Bath process, as illustrated by the cab frame shown here.

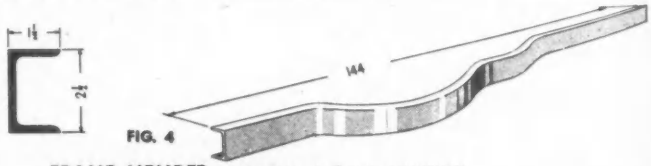


GRILLE BAR MATERIAL—22GA. STAINLESS STEEL

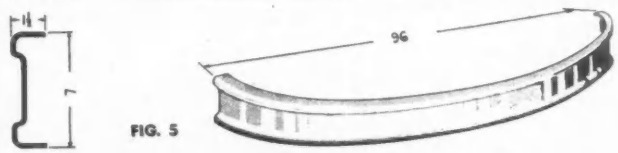
TURRET RING MATERIAL—.040" 24ST ALUMINUM



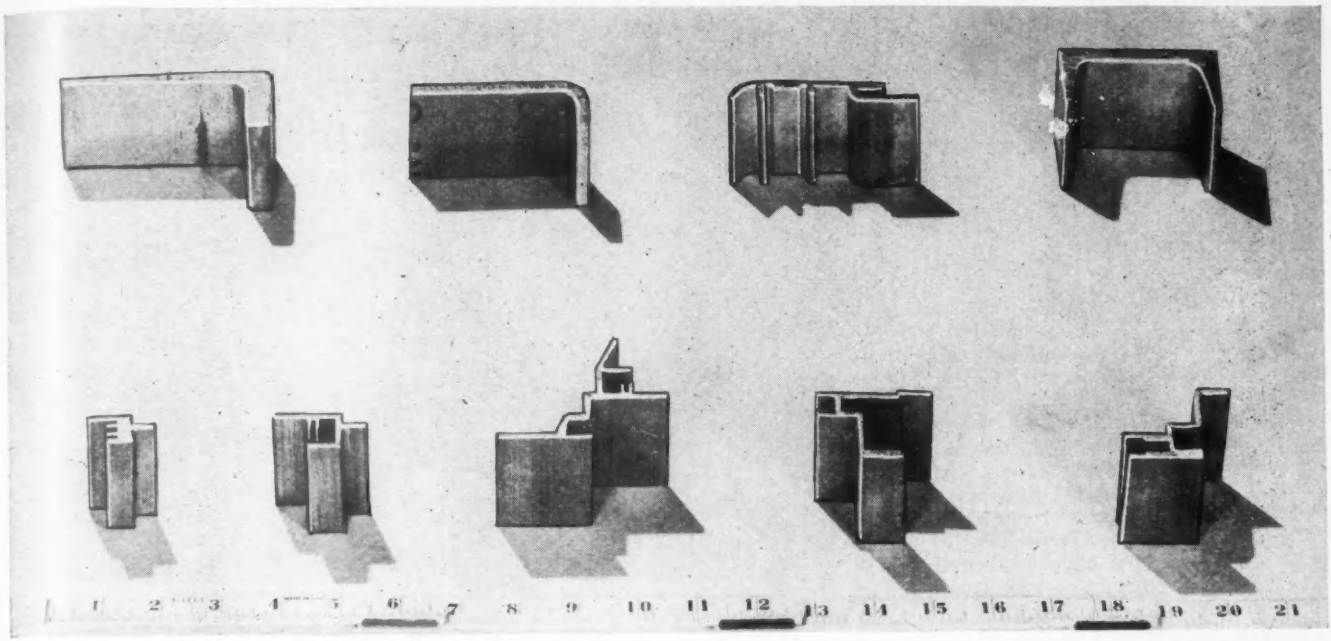
COACH CARLINE MATERIAL—20GA. LOW ALLOY HIGH TENSILE STEEL



FRAME MEMBER MATERIAL—3/16" 61ST ALUMINUM



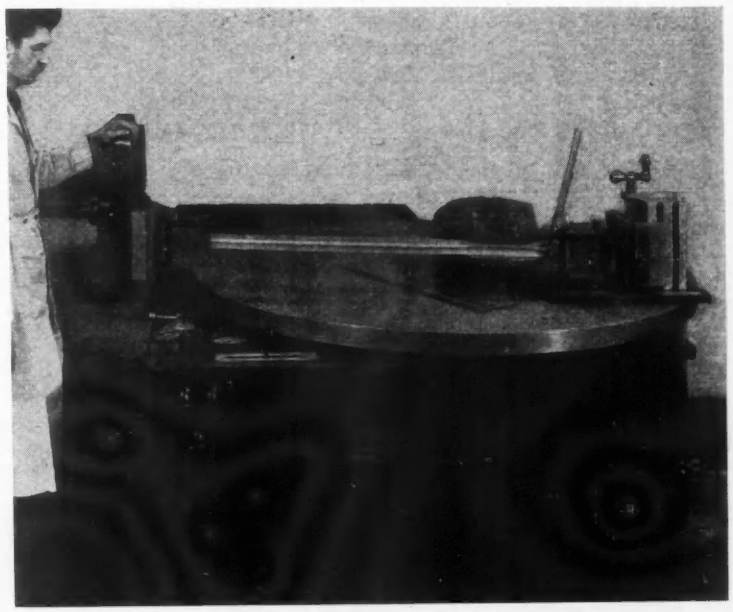
WRAP-AROUND BUMPER MATERIAL—10GA. STAINLESS CLAD STEEL



This group of typical cross-sections shows more forcefully than any word picture the flexibility of the Bath contour forming technique in handling the variety of structural forms and extrusions.

Contour Forming, a Metalworking Process

Parts Now Being Made by This Method for Truck, Bus, and Trailer Bodies and also for Aircraft.



View of Bath contour forming machine tooled for a typical simple bending operation on an extruded section. Note that the work is held in two vises—one at the left, the other at the extreme right.

The company offers a special engineering service to its customers. Its engineering department is prepared to study the needs of a customer and make recommendations as to the type of section and range of formation that can be handled most effectively.

Most of the fabrication is done on Bath Universal Contour Formers which provide a wide range of suitable tonnages for stretch forming, roll forming, or wipe forming, all such operations being done cold in the interest of speed aand economy. Rotary stretch forming—the basis of this technique—is said to be a new concept of an old principle. By pre-stretching the work—whether it be in the form of an extrusion or structural shape or an irregular shape made on a brake—up to the yield point of the material it becomes practical, it is claimed, to produce curvature of any reasonable character without wrinkling, without stretcher strains, and free from scratches or surface imperfection. Moreover, the technique provides unusual control of spring-back in elastic materials, thus contributing to accuracy and interchangeability of large parts.

In rotary stretch forming the work, regardless of cross-section, is grasped in a set of jaws designed to increase the pressure of the grip as increased tension is applied. One set of (*Turn to page* 67, *please*)

Trends in Farm Tractors

By Lloyd F. Overholt,
Development Division
International Harvester Co.

THE wide assortment of available tractors has done much to speed the mechanization of the farm and is responsible for a tremendous increase in the number of tractors in use on the farms. According to the balance sheet of agriculture, there are now more than 2¾ million tractors on the land as compared to 1½ million just prior to World War II and less than ¼ million just before World War I. Wider use of tractors and the development of specialized machinery has demanded increased efficiency, flexibility and workability in the modern tractor; consequently, the past two decades have witnessed some rather remarkable advancements in farm tractor design.

Present-day tractors are far more efficient than in the days when two and three-speed transmissions and steel wheel equipment were customary. Perhaps the greatest gain in tractor efficiency resulted from the popular acceptance of rubber tires. A careful analysis of results obtained by the University of Nebraska shows that rubber tired tractors have an average mechanical efficiency 18 per cent higher than steel wheeled equipment in the plowing speeds. Under average field conditions, however, the difference in over all tractor efficiency is probably not more than 15 per cent.

Rubber tires, due to their lower rolling resistance, enabled much higher operating speeds, and this is where the rubber tires provided the greatest advantage. Following the adoption of rubber tires by the Farm Tractor Industry, trends in farm tractor design were toward improvement in power trains and a wider selection of operating speeds. Progress was made through refinements in gear design, metallurgy and manufacturing technique, resulting in smaller, more compact and less costly transmissions. Four forward speeds became the convention and some manufacturers added a fifth or even a sixth high road speed—thanks to the rubber tire.

This wider selection of operating speeds enabled the farmer to select a speed at which he could operate most efficiently. In other words, in order to maintain the highest tractor efficiency, he should operate in the highest transmission speed that

(*Turn to page* 64, *Please*)

1947 TRACTOR SHIPMENTS*

In Units and Their Value and Hp Classifications

	Manufacturers' Shipments							
	Total		Farm Use		Non-farm Use		Export	
Type and hp of Tractor	Number	Value	Number	Value	Number	Value	Number	Value
Wheel type								
All Purpose								
8 and under 15 belt hp	8,291	$ 3,790,906	7,073	$3,246,521	.....	$.....	1,218	$ 544,385
15 and under 25 belt hp	262,293	184,364,156	231,726	162,955,497	2,274	1,793,591	28,293	19,615,068
25 and under 30 belt hp	25,622	24,460,306	22,091	21,228,297	.....	.....	3,531	3,232,009
30 and under 35 belt hp	58,611	55,580,485	50,304	47,666,622	.....	.....	8,307	7,913,863
35 and under 45 belt hp	5,911	8,659,882	4,965	7,433,443	.....	.....	946	1,226,439
Total—1947	360,728	276,855,735	316,159	242,530,380	2,274	1,793,591	42,295	32,531,764
Total—1946	218,187	155,872,643	185,451	133,081,125	2,344	1,602,897	30,392	21,188,621
Other								
8 and under 20 belt hp	3,819	2,445,468	659	407,017	2,124	1,342,642	1,036	695,809
20 and under 25 belt hp	12,627	9,765,207	3,644	2,729,182	3,734	3,209,782	5,249	3,826,243
25 and under 35 belt hp	15,692	15,219,604	2,809	2,798,967	2,019	2,150,389	10,864	10,270,248
35 and under 45 belt hp	21,653	29,833,133	9,321	11,419,402	2,190	5,655,528	10,142	12,758,203
45 belt hp and over	5,485	8,449,139	2,774	4,154,346	556	1,066,755	2,155	3,228,038
Total—1947	59,276	65,712,551	19,207	21,508,914	10,623	13,425,096	29,446	30,778,541
Total—1946	37,151	36,399,481	10,592	10,571,335	8,564	8,638,871	17,995	17,189,275
Total—Wheel type—1947	420,004	$342,568,286	335,366	$264,039,294	12,897	$15,218,687	71,741	$63,310,305
Total—Wheel type—1946	255,338	$192,272,124	196,043	$143,652,460	10,908	$10,241,768	48,387	$38,377,896
Tracklaying type								
Under 35 drawbar hp	12,084	20,492,971	5,477	8,799,282	3,751	6,376,350	2,856	5,317,339
35 to 49 drawbar hp	9,597	27,912,164	2,111	5,705,358	4,809	14,503,225	2,677	7,703,581
50 to 69 drawbar hp	7,214	29,923,535	1,204	5,028,900	3,951	16,212,156	2,059	8,682,479
70 to 94 drawbar hp	5,373	29,458,350	261	1,555,485	3,906	21,041,196	1,206	6,861,669
95 drawbar hp and over	3,339	26,428,223	45	369,339	2,443	19,457,584	851	6,601,300
Total—Tracklaying type—1947	37,607	$134,215,243	9,098	$21,458,364	18,860	$77,590,511	9,649	$35,166,368
Total—Tracklaying type—1946	26,265	82,933,679	7,156	14,131,602	12,787	48,270,605	6,322	20,531,472
Garden tractors—1947	168,009	33,012,040	147,769	28,617,413	5,920	822,232	14,320	3,572,395
Garden tractors—1946	115,241	23,925,724	106,911	21,726,537	2,268	439,281	6,062	1,759,906
Total—All tractors—1947	625,620	$509,795,569	492,233	$314,115,071	37,677	$93,631,430	95,710	$102,049,068
Total—All tractors—1946	396,844	$299,131,527	310,110	$179,510,599	25,963	$58,951,654	60,771	$60,669,274

*—Industry Division—Bureau of the Census, Department of Commerce.

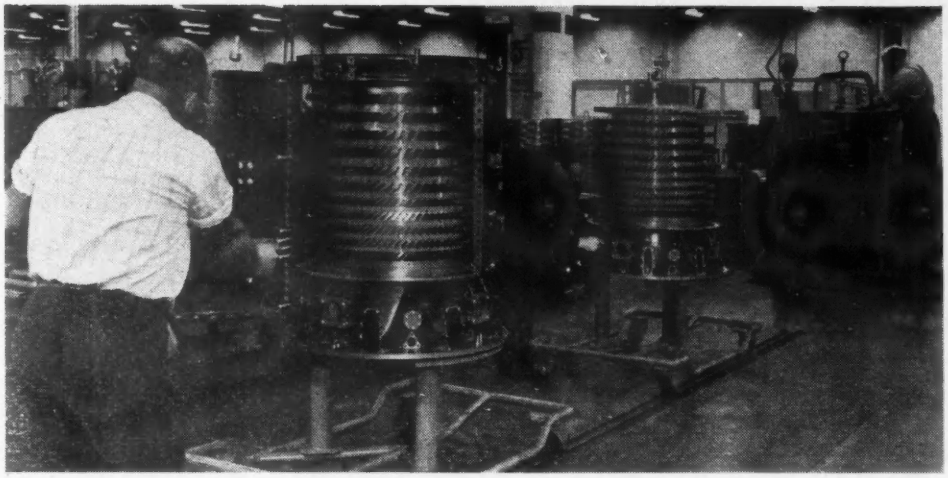
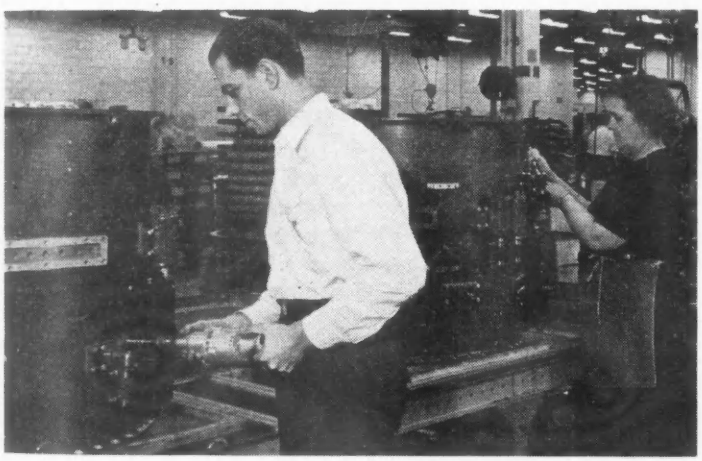
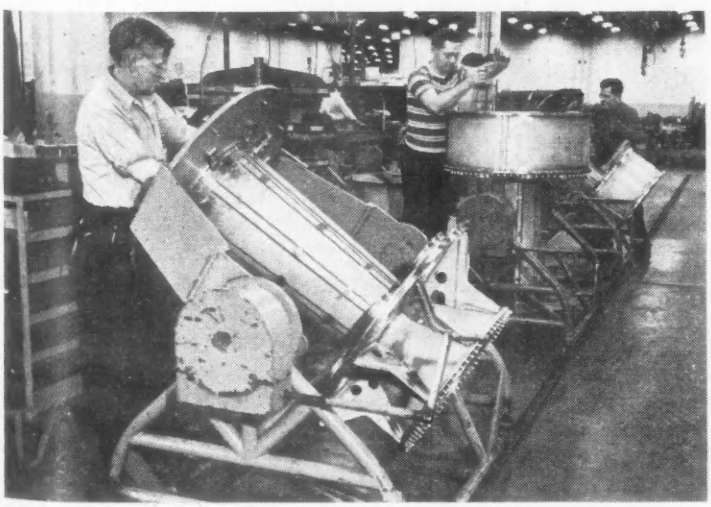


Fig. 1—Assembly of the mid-frame and compressor rotor element in the fixture at the extreme right in the background. For the next operation the sub-assembly is removed from the fixture by means of the huge clamp, transferred to the middle station. The third station in the foreground shows the installation of the forward frame at the top and start of compressor casing assembly.

J35-A-15 Turbo-Jet Engine Production at Allison





By Joseph Geschelin

THE Allison Division, General Motors Corp., Indianapolis, Ind., has placed in regular production—using mass production methods—the GE-Allison J35-A-15 turbo-jet engine for aircraft. With the inception of this project in the Allison plant there began a continuous program of research and development, leading to improvements in design and in production methods with the object of ultimately increasing performance and durability.

This turbo-jet engine employs an 11 stage axial-flow compressor, multiple combustion chambers, and a single-stage turbine. The present model is 145 in. in length, 40 in. in diameter, has a frontal area of 7.7 sq ft, and weighs 2425 lb. Maximum rating is in excess of 3500 lb thrust (static) at 7700 rpm at sea level.

The compressor has a two-piece alumi-

Fig. 2 (Top, left)—The line shown here prepares the upper and lower compressor casings for assembly.

Fig. 3 (Lower left)—Sub-assembly line preparing aft frames by bolting together the various fabricated sections.

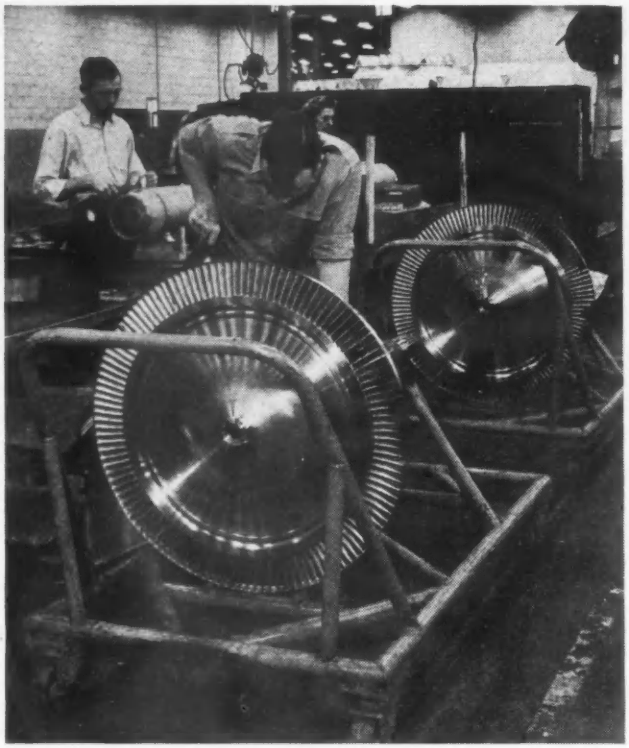


Fig. 4—This view shows the preparation of the turbine rotor assembly for the final green line assembly. In the background may be seen the assembly of combustion chambers.

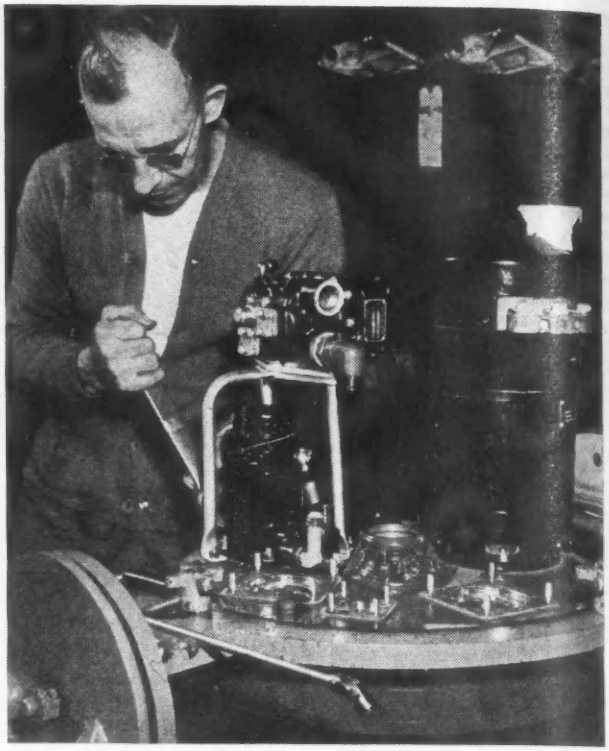


Fig. 5—The accumulator case or accessory assembly is built up individually on special stands such as the one seen here.

num alloy stator casing with one row of steel inlet guide vanes, 11 rows of steel compressor blades, and one row of steel straightening vanes. The 11-stage rotor is built up of 10 aluminum alloy discs and one steel disc shrunk on a hollow steel shaft, each disc having a row of steel blades.

The system of combustion chambers consists of eight interconnected stainless steel combustion chambers of straight-through flow type. Within each of these is a perforated stainless-steel flame tube. The latter, in turn, are each fitted with a duplex fuel-injection nozzle in the closed front end, with downstream injection.

The single-stage axial-flow gas turbine is made up of a fabricated stainless steel casing and diaphragm with 63 inserted steel nozzle guide vanes. The rotor disc contains 126 alloy steel blades welded to the rim. The rotor is held in place by a single bolt passing through the rotor shaft into the compressor rotor assembly. The exhaust system of the engine consists of a stainless steel outer cone and a fixed inner cone, enveloped by a heat insulating shroud.

The following is intended to describe briefly and illustrate the method of assembly for the green run. It may be observed that in order to conform with mass production techniques, the main assembly has been sub-divided into a number of major sub-assemblies, final assembly being integrated on a short five-station line at the outer boundary of the department.

Taking the major sub-assemblies in sequence, Fig. 1 shows the mid-frame and rotor compressor assembly operation in the background at the right. When this has been completed, the assembly is removed from the fixture by means of the huge hoist-mounted arm (which may be seen directly in front of the fixture) and installed on the assembly dolly in the second station in an inverted position. The complete sub-assembly consists of the mid-frame and rotor, upper and lower compressor casings, and the forward frame.

Meanwhile, to one side of the assembly line, is the subassembly of compressor casings, as shown in Fig. 2. Here the upper compressor casing is fitted with air filters and other accessories and made ready for application on the subassembly line.

Referring again to Fig. 1, it will be noted that at the third station in foreground, the operator has assembled the forward frame and is mounting the casings. Owing to the enormous pressures contained within the compressor casing, unusual precautions are taken to assure gas tightness. To this end, the casing has 80 fastenings around the front and rear periphery and 46 fastenings along the two longitudinal joints.

Fig. 3 shows the trunnion type fixtures employed on the line for making the aft frame sub-assembly. This assembly is composed of a number of fabricated sections fastened securely.

Next in sequence is the turbine rotor assembly which is completed on the line seen in Fig. 4 and routed directly to the green final assembly. In the background in this view is part of the station for the assembly of combustion chambers.

The last major sub-assembly is that of the accumulator case or accessory assembly, made up as a self-contained unit. The start of this assembly is seen in Fig. 5, the units being built up on the specially designed trunnion fixture. This assembly includes

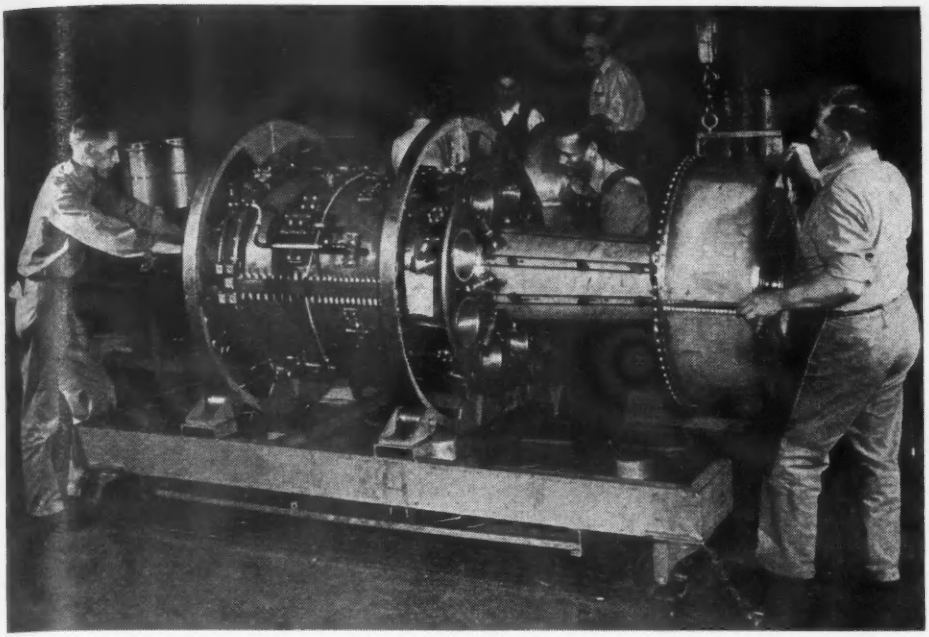


Fig. 6—Close-up of one of the final assembly stations on the green line. Here may be seen the method of installing the aft frame section.

the following accessories:

Combination starter-generator	Fuel pump
Barometric	Lube pump
Governor	Tachometer generator
Fuel control	Fuel and oil filters

The final assembly is arranged with five stations in line, the major sub-assemblies described above being fed to each of the stations in the following order:

1—Compressor assembly
Combustion chamber assembly
2—Aft frame assembly
Accumulator case assembly
3—Turbine rotor assembly
4—Tail cone assembly installed
Engine is pumped to lubricate all over, then transferred to Station 5
5—Initial run-in on production test stand.

Following the initial run-in and inspection the engine is ready for transport to the test blocks for run schedule. Fig. 6 is a close-up of one of the final assembly stations with an aft frame assembly in the process of installation. Fig. 7 is a general view of a corner of assembly department, engines in various stages of assembly being shown in the foreground.

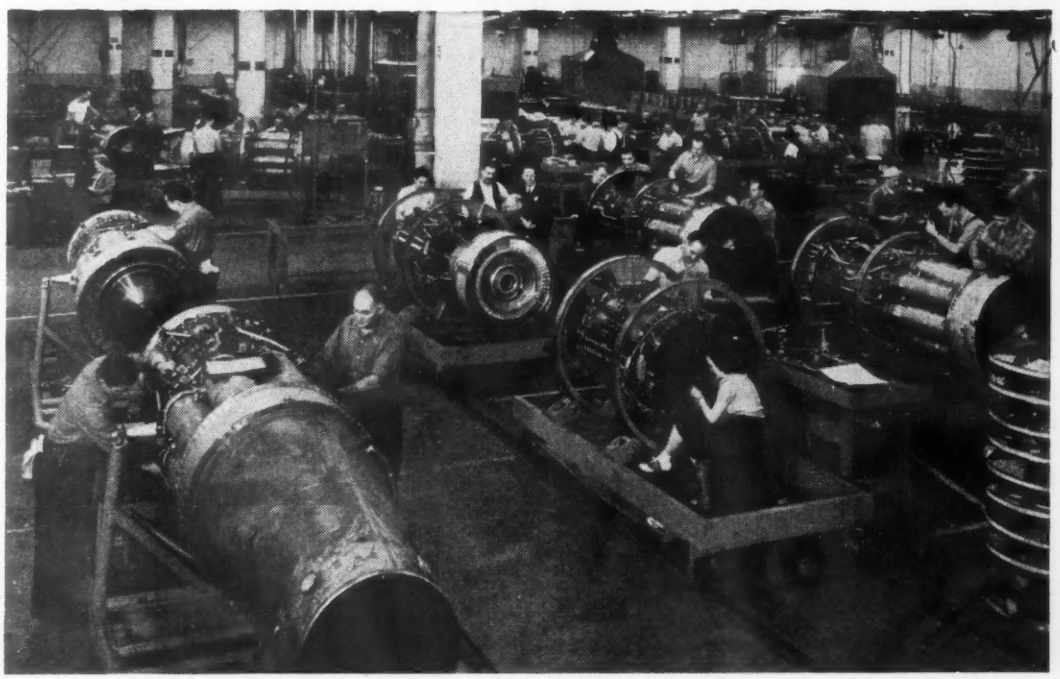


Fig. 7 — General perspective of the assembly department showing J35 turbo-jet engines in various stages of assembly.

Unconventional Methods to Make U-Flex Piston

THE Thompson-Products U-Flex Oil control piston ring is of exceptional interest both because of its unique design and because of the unconventional manufacturing technique employed to mass produce it at competitive cost levels. At present the U-Flex ring is available in sizes ranging from 2½ to 6¼ in. in diameter and is furnished for both gasoline and Diesel engines.

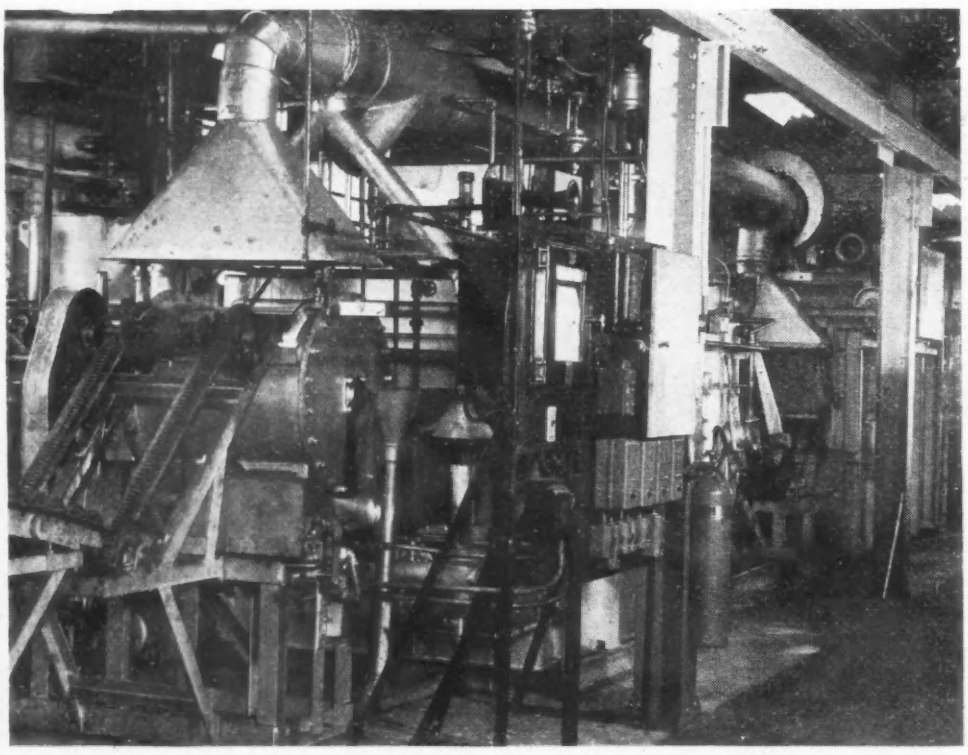
In its manufacturing processes this ring starts in the form of a narrow strip of SAE 1095 steel supplied in coils. In all respects it is a press formation as contrasted with a casting of gray iron or steel alloy. In the latest development the steel coil is presented to a newly tooled Waterbury-Farrel press which is fitted with an ingenious progressive die. In this press the strip is perforated at one station, the alternate slots in the edges are sheared at the next station, and the strip is folded into the U section as it leaves the die.

Work from this unit is fed continuously into a second machine in which the strip is cut to the length of a single ring, the U-section is rolled to size, and each piece coiled into circular form by means of rolls at the end of the unit.

Now in the form of rings the work is transferred to a small Bliss press where it is fitted into a circular coining die. In the functioning of this operation lies much of the character of the finished product. In the initial press operation slots are sheared with alternate spacing in the edges of the U, the slots being about 0.008 in. in width. The coining operation, in turn, squeezes the ring into a circle of the desired diameter, and, in the process, it compresses each of the slots to about 0.001 in. At the same time the coining corrects the U-section for proper width.

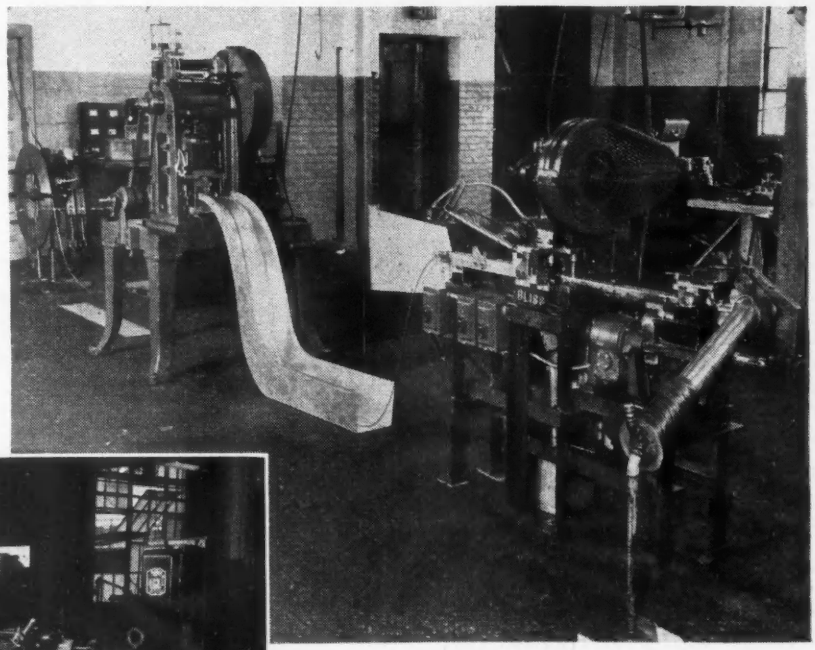
In order to develop a ring possessing spring properties the next operation is designed to stretch the previously coined circle uniformly to produce a standard overlap for a ring of given diameter. This is done by installing the rings over a tapered mandrel and pressing them over it.

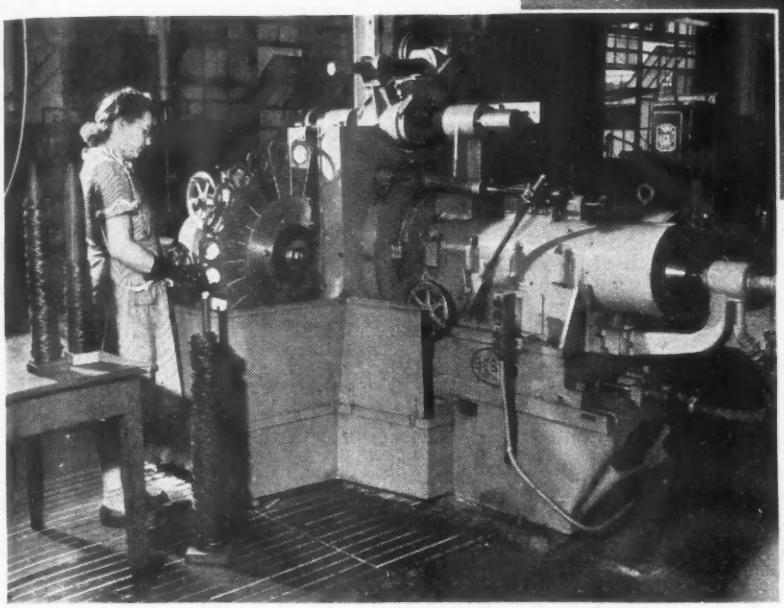
The "stretched" rings now are ready for heat treatment. For this purpose they are assembled on a special mandrel, covered with a mesh envelope and locked securely. The heat treating mandrels then are fed onto the conveyor leading into the first heat treating stage—hardening at 1500 F. This is done in a special gas-fired Surface Combustion furnace having a twin screw feeding conveyor on which the mandrels are transported.



Perspective of new Surface Combustion gas fired heat treating equipment with hardening furnace at the left, drawing furnace at the extreme right. View also shows the loading conveyor at the left and conveyor system between the two units at the right.

Used Rings





(Above) The latest improvement in manufacturing set up is the Waterbury-Farrel press at the left which completes the perforating and notching and U-forming in a single pass through the progressive die. The strip feeds continuously to the second unit at the right where it is cut to length and rolled into rings.

(Left) An example of advanced equipment is this Besly double-end piston ring grinder. Rings are inserted in the rotary indexing fixture at the center and are ground on both sides to exact width in one revolution.

At the exit end the furnace is provided with an oil quench tank, the work being immersed in the tank automatically—one mandrel at a time—by means of the S-C "lowerator" mechanism. Following the quench, the mandrel is picked up by the flight conveyor and carried into the second Surface Combustion unit—the draw furnace. Here the work is held at around 650 F, the treatment producing a hardness of 50-55 Rc.

The rings are ready at this stage for the finishing operations. The first step is to grind both sides simultaneously to exact width and with the desired surface finish. This is done in a new Besly double-end grinder fitted with a paddle-type indexing fixture.

The next step is to grind the O.D. to prescribed tolerances. For this purpose each ring is compressed to zero gap by installing a keeper spring in the groove. Then the rings are fitted onto a mandrel, ground to size in a new Cincinnati external grinder.

The final mechanical operation is that of burring and polishing all over.

(*Turn to page 74, please*)

(Below) The major operation in making the U-Flex ring is coining in the circular die in the Bliss press shown here.

Some Strings Attached to 1949 Military

By Robert McLarren

PRESIDENT Truman has signed into law the $3,198,100,000 aircraft procurement program which will provide a 70 Group Air Force and a 24 Group Naval Aviation during the next two and one-half years. Thus, with the stroke of a pen aircraft manufacturing industry was put back in the military business—with strings attached.

This total program is made up of several groups of funds. It consists of $773,100,000 of regular fiscal year 1949 Air Force appropriations, plus $450,000,000 extra cash plus $250,000,000 to liquidate previously approved contract authorizations plus an extra $822,000,000 in immediately available funds tacked on by the Congress to permit immediate acceleration of the 70 Group program. This constitutes a total Air Force appropriation of $2,295,100,000.

Naval Aviation funds consist of $478,000,000 available now from fiscal 1949 funds, plus $275,000,000 to be used as supplemental money, plus $150,000,000 to meet contract authorizations previously approved by Congress, a total Naval Aviation appropriation of $903,000,000. This program will permit the Bureau of Aeronautics to purchase 807 fighters, 515 attack planes, 113 patrol planes, 20 transports and 80 helicopters, a total of 1535 new aircraft with an airframe weight of 11,945,000 lb. A total of 746 of these planes will be jet propelled. Of the 1535 to be procured, 1200 will be scheduled for delivery during fiscal 1949, of which 1140 will be purchased from 1948 fiscal year funds through liquidation of previous contract authorizations and only 60 will be paid for with fiscal 1949 funds plus 1475 planes to be delivered during 1950.

Air Force will buy 2727 new aircraft made up of 1575 jet fighters, 243 bombers and 909 transport, training, rescue, liaison and reconnaissance types. All of these new planes will be of types already in production or of which the prototype has already passed preliminary flight tests.

This program, largest peacetime air program in U. S. history, constitutes only the minimum peacetime aviation establishment considered essential to the nation's defense by the President's Air Policy Commission and the Congressional Air Policy Board. It is, however, only a start on the actual 70-Group program, which is not scheduled for fulfillment until 1952, the year estimated as the earliest at which Russia could be prepared to wage an atomic war.

But passage of the bills has not ended the Administration's battle to restrict the Air Force to 66-Groups; and thus: the strings. Firstly, President Truman indicated during signing of the bill that he intends to take full opportunity of his legal right to review the program in September and again in December with Defense Secretary Forrestal and the Director of the Budget (presently unnamed) against the background of the national economy and if it appears that the latter is endangered by the program, the latter will be cutback as required. President Truman has the legal right to rescind all or portions of Congressional appropriations as he may deem fit and reliable sources indicate that he has every intention of completely blocking the $822,000,000 tacked onto the program by Congress over his personal objections.

The bill contains a vast array of loopholes. First of all it makes mysterious reference to "fiscal years 1949 and 1950" indicating that perhaps this money will have to be stretched into 1950. It specifies that the President and his military and budget aides must be satisfied that "all contracts let are necessary to the national defense" and, furthermore, that they insure "maximum utilization of improvements in aircraft and equipment consistent with the defense needs of the United States." Greatest threat to the program is the statement that the "national defense program must be based on a strong economic system and must depend on a level of expenditures which can be supported in subsequent years," an elastic concept subject to myriad interpretations.

President Truman has already fired his opening round in the battle by asking for only enough Air Force "housekeeping funds" to support a 66-Group program. Actually, while this is indicative of his absolute refusal to "go along" with the 70-Group program, it is not viewed seriously at the moment due to the fact that the 66-Group and 70-Group programs differ only in four ground cooperation and air lift

Aircraft Program

groups (one heavy cargo, one medium cargo and two light bomber groups) to be used by General Bradley's Army Field Forces for paratroop, air landed supplies and ground force cooperation duties. Gen. Bradley stated that his forces would not be able to accommodate these four groups even if they were made available and it was their temporary removal from the program that created the 66-Group "compromise" proposal of Secretary Forrestal.

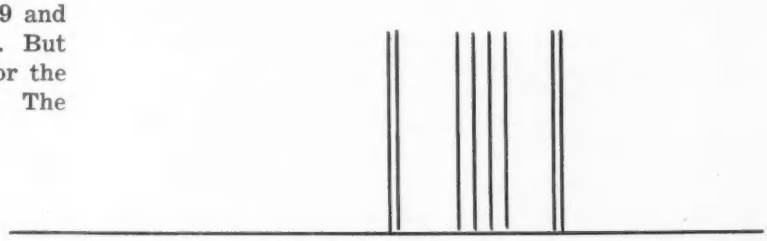
Secretary Forrestal avows that air power is of only tertiary importance after naval and ground strength in that order. His concept is based on his studied opinion that this nation's defense resides firstly in submarine defense, secondly in the capture and security of air bases and thirdly on strategic air attack from these advanced bases against the enemy—the exact conditions prevailing in World War II! It is against this background of a naval—and ground—minded Secretary of Defense supported whole-heartedly by the President of the United States that this new three billion dollar aircraft procurement program is launched. And that is the heaviest string!

The aircraft manufacturing industry views the new program with mixed emotions. Firstly, it is not an iron-clad program, leaving the industry pretty much in its current state of frustration. It is certain, however, that industry financial losses are approaching an end and the current prediction is that it will operate slightly in the "black" this year, that all of the industry will be well in the "black" in 1949 and that 1950 will be a year of substantial profits. But the biggest headache is: "after 1950 what?" for the current program will have been completed. The determinant factor will be the international situation and many industry observers are convinced that a let-up even in the next six months will mean a considerable reduction in the current program—a fragile reed on which to plan the next few years of an industry.

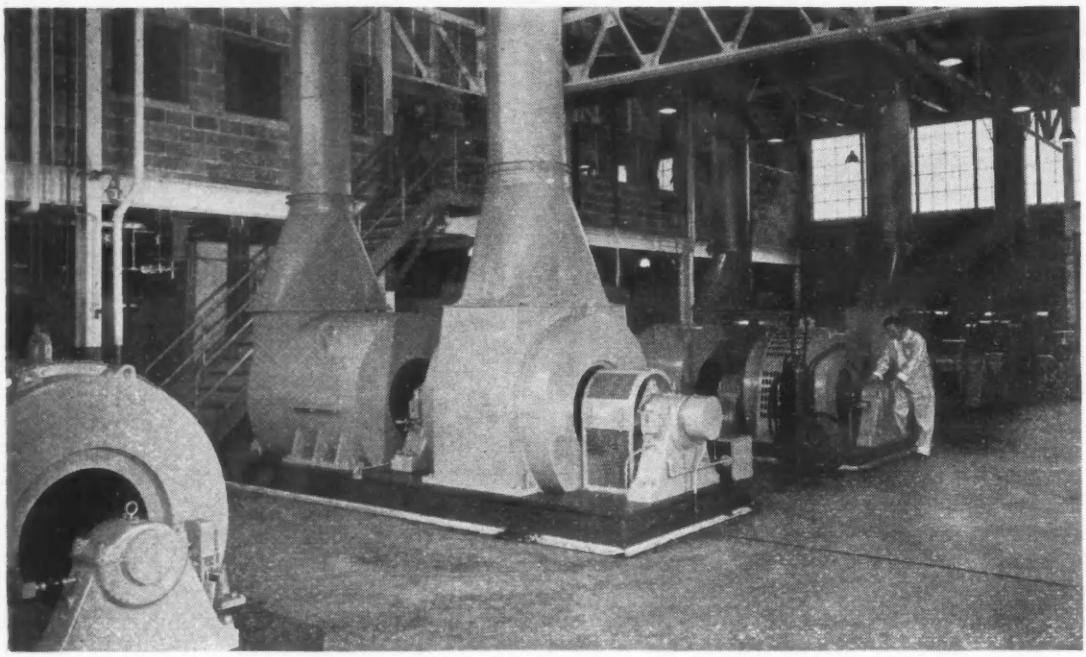
For these reasons the industry is definitely not "launching" itself into an expansion program. About 100,000 new employes will be hired in the next few months bringing total employment next year in the 275,000 to 300,000 bracket. This hiring program will not savor of the wartime "street to supervisor in 90-days" type of activity, but will follow the present strict qualification requirements. Most-needed are experienced engineers and skilled labor preferably with aircraft or automobile experience. Premium wages will not be offered as an inducement, as it was during the war.

Greatest threat facing the industry is that old bugaboo of production—shortages. Engines, accessories and other Government-furnished equipment items are in short supply with engines alone requiring 18-month delivery privileges. Both aluminum and steel are in ample supply for the aircraft industry, one estimate being that the industry's aluminum requirements could be met with three-weeks of production, its steel requirements in three-days of production by those industries.

Sub-contracting will not expand substantially. This phase of the industry has already shrunk from its 50 per cent level during the war to an estimated 15 per cent of total airframe weight today. It may go even lower due to several factors—A-N standards have been tightened up to the point that only well-equipped shops using highly-skilled labor can perform the jobs; the aircraft industry will have more time and facilities to fabricate their own sub-assemblies and Air Force and Navy procurement planning against a future industry mobilization will require that those plants not fully utilized by prime contracts participate in the program (*Turn to page* 92, *please*)



How the Aircraft Industry Will Be Affected by Government's Three Billion Dollar Procurement Plans Is Concisely and Effectively Told in This Special Article



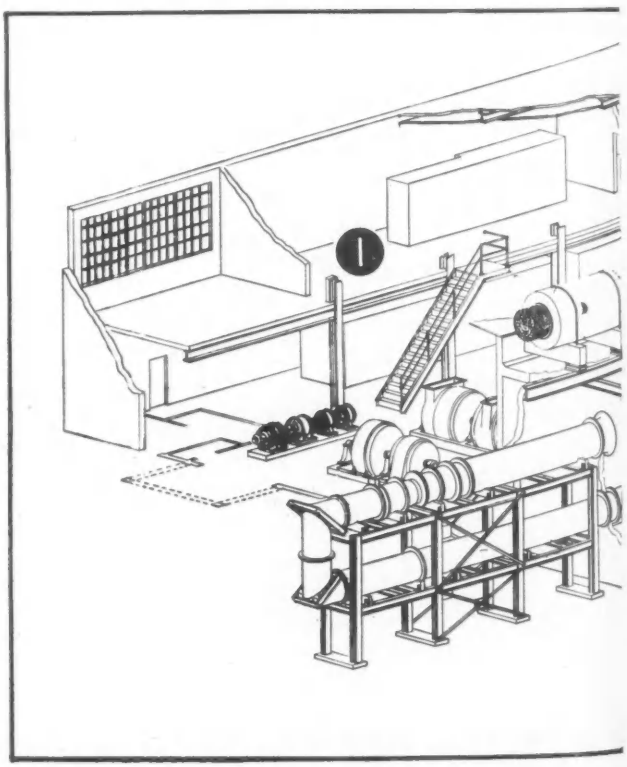
These frequency changers control speed and power of the three 500-hp prime movers used in compressor tests.

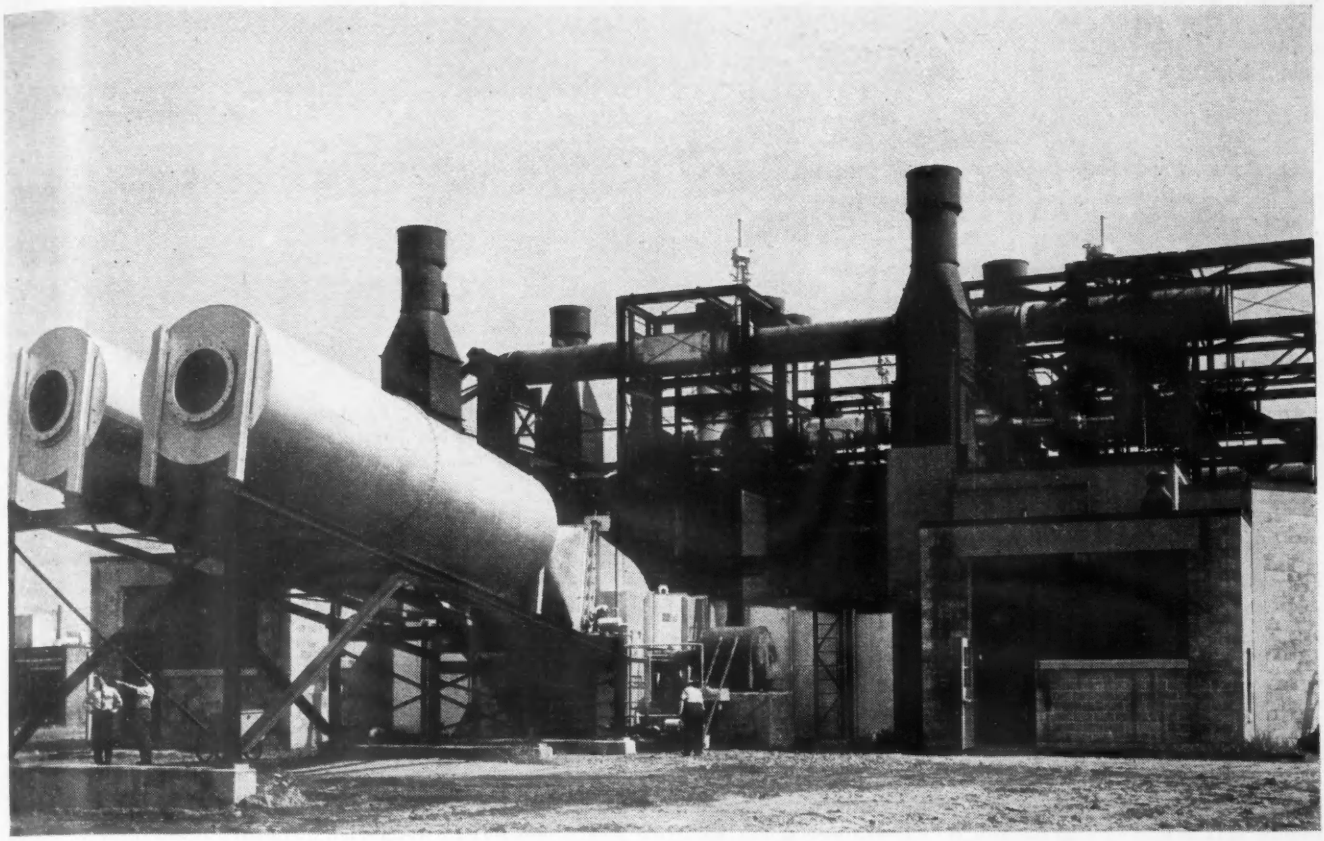
Wright's New Facilities for Testing High Output Turbines

WRIGHT Aeronautical Corp.'s new $3½ million gas turbine laboratory is giving a much-needed impetus to the U. S. Air Force's program for development of high-power turbo-prop engines. It is currently conducting component tests on what are believed to be the two most powerful aircraft engines in the world: the Lockheed designed XJ-37 and the new Wright turbo-prop. The Lockheed power plant is capable of developing an output equivalent to 8000 hp, while the Wright engine output is approximately 8800 hp.

The new laboratory, which was built by the Air Force at the Wright plant in Wood-Ridge, New Jersey, was designed essentially to test compressors, combustion chambers and turbines—the main components of the gas turbine engine. Wright engineers believe that, by isolating these major sections of the engine for individual investigation, development of the complete power plant can be accomplished at a greater speed and at a lower cost. Experimental and production testing of complete engines will be carried out in another section of the plant.

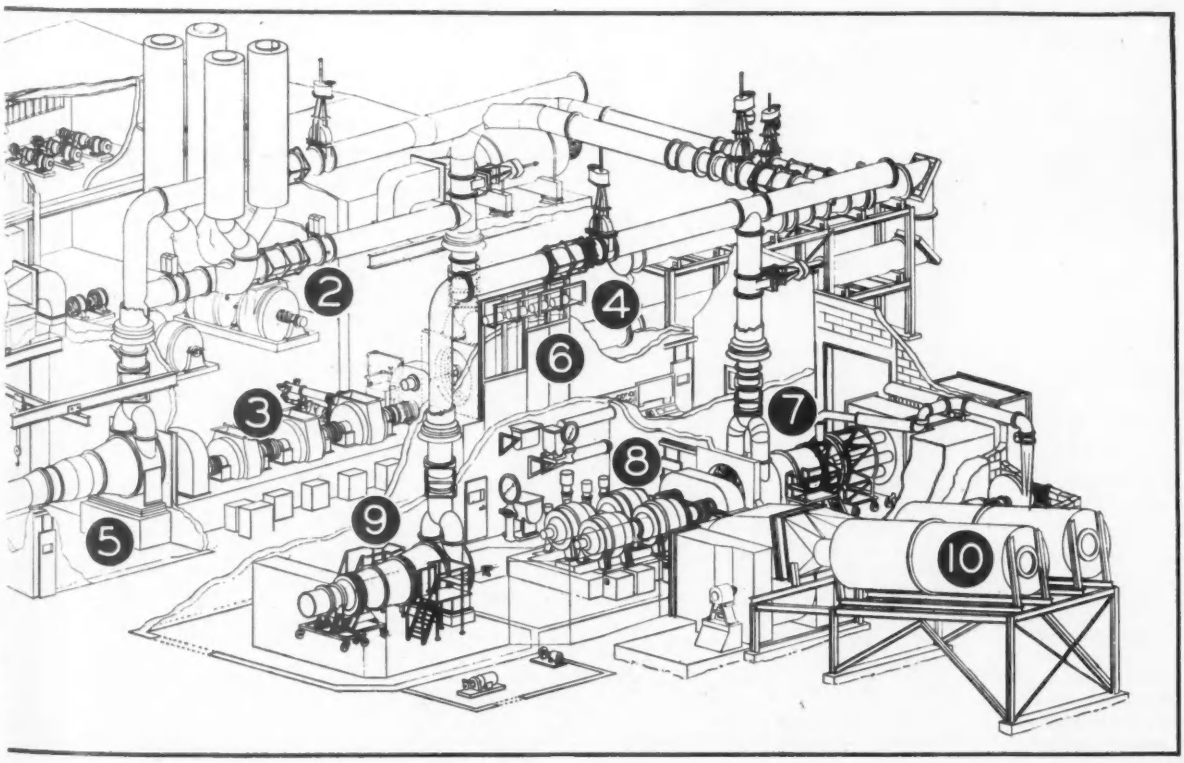
The two-story laboratory building, illustrated on these pages, has a floor space of more than 16,000

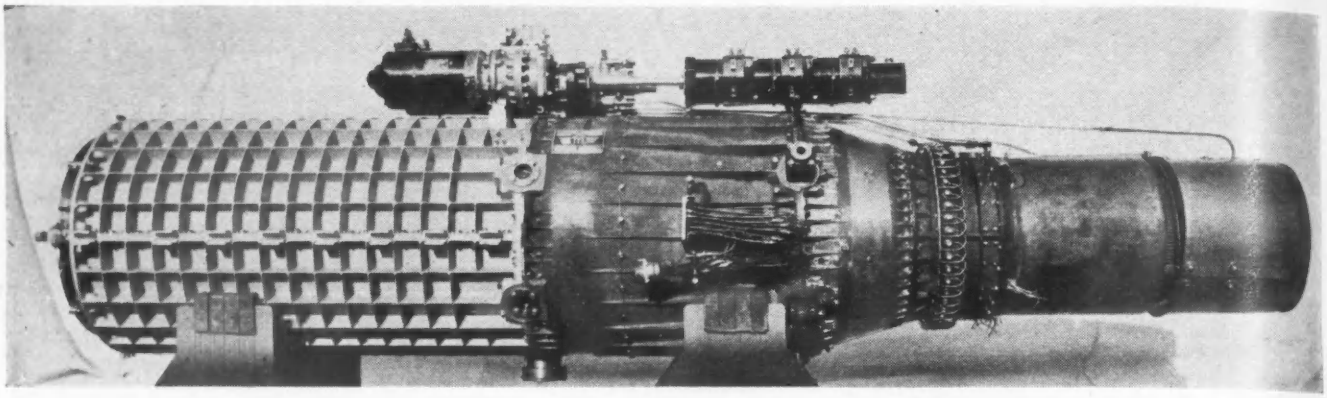




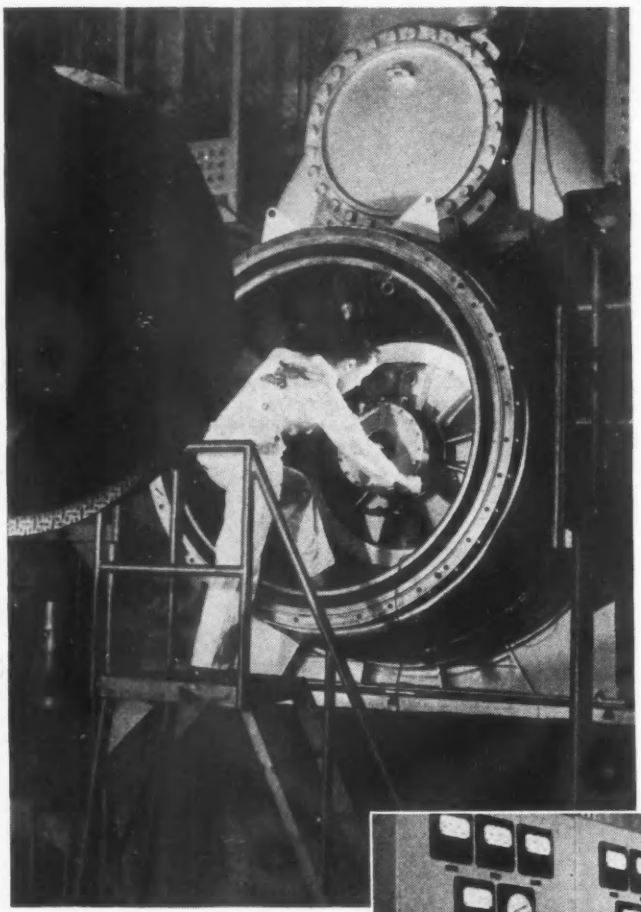
The roar of hot exhaust gas from burner and turbine tests is stifled by these two 28-ft mufflers mounted at the rear of the Development Laboratory.

In this cutaway sketch is shown the inner layout of the Wright Aeronautical Gas Turbine Development Laboratory. The electrical control center from which all power is dispatched to the building is located on a mezzanine at (1). Frequency changers (2) regulate speed of three 5000-hp prime movers (3). These motors drive gas-turbine compressors on test at (4) and (5). Air from (4) and (5) is piped overhead for burner test. Tests are coordinated and data recorded at master control room (6). Burner and turbine components are tested together at (7) and power generated there is absorbed by 20,000 hp dynamometer at (8). Burner components alone are tested at (9) and exhaust from (7) and (9) is discharged through 28-ft mufflers at (10).





Now being tested at the new Wright Gas Turbine Development Laboratory is this 8000-hp turbo-jet engine, the Lockheed XJ-37. The unit, which can be used as either a pure jet or in a turbine-propeller combination, is reported to have the lowest fuel consumption of any jet engine yet developed.

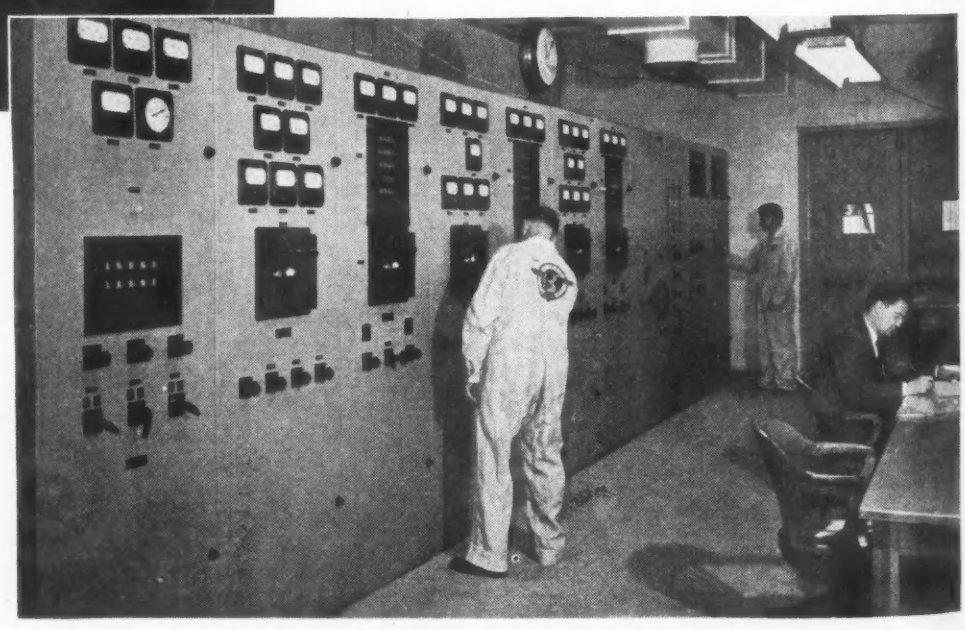


(Above) Gas turbine compressors are mounted in this rig for individual test. Coupling in front of man on stand transmits power from prime movers in adjoining room.

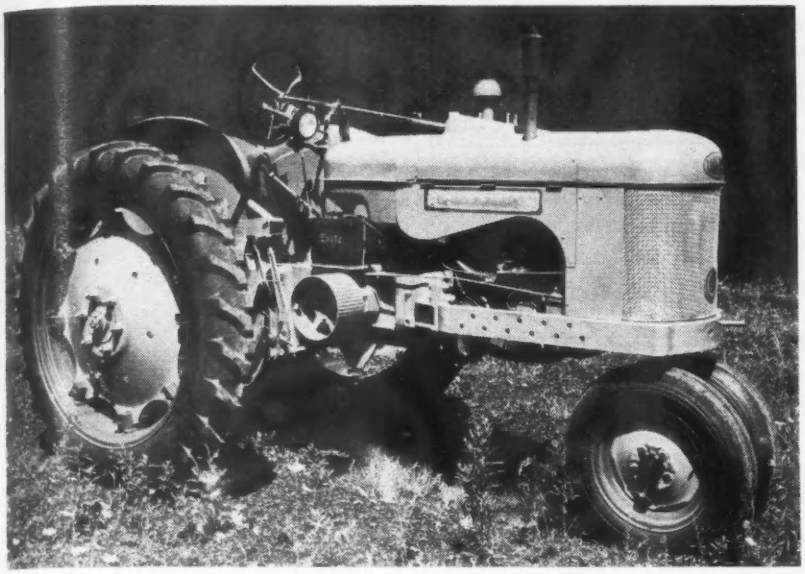
sq ft. This space is divided, functionally, into seven sections: switchgear, motor and generator room; prime mover area; compressor test rooms; test control room, burner test; and turner-turbine test.

The electrical power for the laboratory is allocated and controlled from a large panel located at the north end of the building. Power from this panel is fed into a set of frequency changers which control the operation of the prime movers which in turn drive the compressor test units. The prime movers are three 5000-hp motors mounted in a line on heavy concrete foundations. At either end of the series of motors the shaft passes through reduction gears to drive either of two compressors. The compressors draw their air through intake-filters in the roof and through an exterior U-shaped pipe which contains a large Venturi and has air straighteners at the elbows. The air which leaves the compressors may be used at high pressure in the burner and turbine-burner tests. If these sections are not operating at the time of the compressor test, the air is exhausted through four vertical silencers located on the roof above the

(*Turn to page 74, please*)



(Right) From this master control panel, all electrical current for the development laboratory is dispatched to the prime movers and other heavy equipment.



Export Tractor Designed to Facilitate Servicing

A TRACTOR especially designed for the export market is to be manufactured by Transmar, Inc., at Marshall, Texas, from plans produced and tested by Pioneer Engineering and Manufacturing Co., Detroit. A feature of the new tractor will be its simplicity in design and in field servicing. It is expected that the South American market will take much of the output after the plant starts production.

Several unusual means of obtaining simplicity combined with flexibility have been adopted. One of these is the elimination of tapped holes in the frame castings, and wherever possible elsewhere, in favor of through-bolts. This permits field repairs to be made with whatever bolts of suitable size may be available, regardless of thread standards. A saving in production costs is expected from the elimination of tapped holes also.

To accommodate row crops of different kinds, rear wheel tread can be varied from 56 in. to 84 in. in four-in. steps. The variation is made possible on a standard axle by bolting a dished wheel disk to the hub, and using a wheel rim off center laterally to bolt to the disk. The position of the rim on the disk may then be changed, and the disk may be reversed on the hub, giving a variety of combinations to produce the variable tread without sacrifice of rigidity. Front wheel tread may be adjusted by reversing the wheel disks on the hubs.

In general, the tractor is of the tricycle type, with cast alloy steel semiframe, and with an overall length of 130 in., overall width of 74½ in. minimum and 94½ in. maximum, and overall height of 73½ in. The wheelbase is 81 in. Road clearance at the drawbar is 15½ in. and cultivating clearance at the rear axle is 25 in. Minimum turning radius is 8½ ft.

The power plant is a four-cylinder Continental gasoline engine, model F-162, developing 35 bhp at 1500 rpm. It has a push-button starter. The transmission and rear axle assembly are Timken T-98, with four speeds forward and one in reverse. There is a rear power take-off developing 532 rpm at 1500 rpm of the engine. The belt pulley is of 10 in. diameter, with a 6½-in. face.

Brakes are double-acting, with internal expanding and external contracting shoes acting simultaneously on 7-in. steel drums, which are mounted directly on differential countershafts. Braking of either rear wheel may be done independently of the other, or the brakes may be interlocked and applied to both wheels simultaneously. Brake action is through mechanical linkage with right side foot pedals.

A single plate dry clutch is used, foot-pedal operated. A 16-gal fuel tank is mounted above and behind the engine, with 70-octane gasoline the recommended fuel. The cooling system, which incorporates a Modine radiator of the copper core type, holds 11 qt. Steering is done through an 18-in. wheel, operating an irreversible worm and sector through a universal joint. Front wheels are 16 in. in diameter, and rear wheels are 38 in.

The new tractor has a maximum road speed of 12 mph. The rated horsepower on the drawbar is 26 at 1500 rpm of the engine, while the belt pulley will deliver 29 hp at the belt with the engine turning at the same speed. Under full load and in standard drive, the tractor will develop the following speeds:

	at 1000 rpm	at 1500 rpm
1st gear	1.64 mph	2.46 mph
2nd gear	2.36 mph	3.54 mph
3rd gear	3.28 mph	4.92 mph
4th gear	6.50 mph	9.75 mph
reverse	2.04 mph	3.06 mph

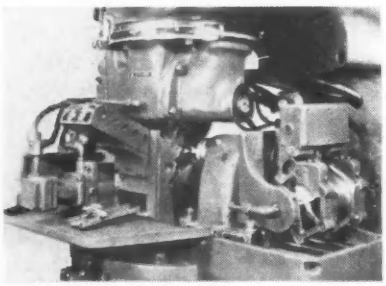
NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56.

J-112—Loader for Gear Shavers

A new automatic loading mechanism for use with Red Ring diagonal gear shaving machines, Models GCV and GCU, has been brought out by the National Broach & Machine Co., Detroit. With this mechanism in operation, these machines run continuously as long as the magazines are supplied with work gears. It is said that one operator can keep the magazines of a battery of such machines filled and the machines in continuous production.

The operation of this mechanism is as follows: At the start of the cycle, head and tailstocks are in retracted position. The loader with a work gear moves toward the cutter and meshes the work gear with the cutter. The head and tailstocks advance and clamp it in shaving position. The loader moves back to the magazine to pick up another work gear, and shaving begins. When shaving is completed, head and tailstocks retract, allowing the shaved gear to drop on to the unloading rails which carry it out of the machine by gravity. Then, a new cycle starts. These cycles are continuous without stopping.



Automatic loader for Red Ring diagonal gear shaving machines Models GCV and GCU.

The magazine supplies work gears to the loader by gravity. The loader which carries the work gear from the magazine to shaving position is air operated. Head and tailstocks are also air operated, and so designed that they will remain positively locked in case of an air line failure during the operating cycle.

Actual time for the loading and unloading of a gear by this mechanism is 2.3 seconds. The shaving time obviously depends upon the type and size of gear and the amount of stock to be removed. That is always predetermined and the machine set for the amount of shaving time required.

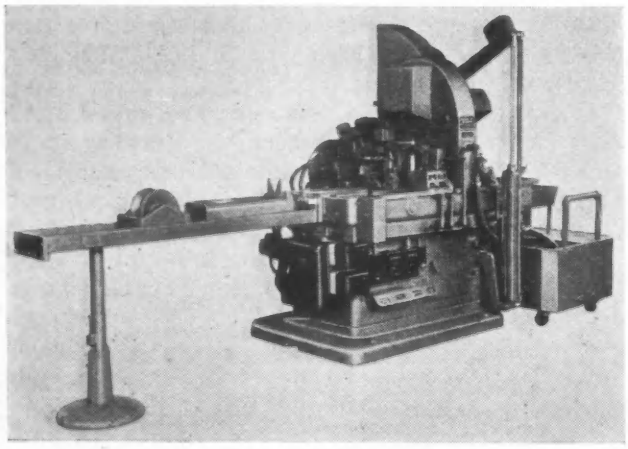
This automatic loading mechanism or types similar to it are adaptable to the shaving of all automotive transmission gears or other gears of approximate sizes.

J-113—Automatic Cutting Machine

Andrew C. Campbell Division of American Chain & Cable Co., Inc., Bridgeport, Conn., is introducing its Model 470 Cutamatic, a fully-automatic, abrasive cutting machine with an oscillating head. This new machine is sequence timed and, therefore, regardless of size of stock being cut or length of feed, no adjustment of the timing cycle is required. It will cut materials up to 6 in. diameter solid stock.

Every operation — stock feed, clamping, adjustment for wheel wear, ejection of cut pieces, and stop after final cut—is completely automatic. Here is the cycle of operation for this new Model 470: (1) Abrasive wheel cuts through work. During this time the feed carriage is being returned to left hand or starting position. (2) At completion of cut, abrasive wheel is raised to "up" position. (3) Work clamps are raised clear of work and at the same time clamp of feed carriage is then moved to right against its stop. (4) Bar clamp is released and at same time work clamp moves downward and securely clamps bar into V-block. (5) Abrasive wheel is started downward and cycle repeated.

The machine is also furnished in semi-automatic Model 460.

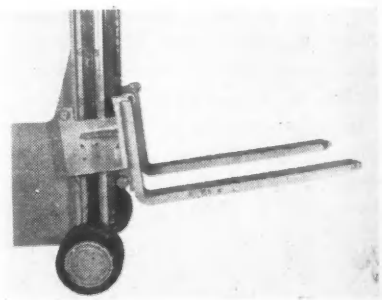


Campbell Model 470 automatic abrasive cutting machine

J-114—Transtacker with New Tilt

A new suspended fork model Transtacker weighing only 3,400 lb and incorporating ten major improvements in its design was announced recently by Automatic Transportation Co., Chicago, Ill. An automatic tilt at carrying position is standard equipment and requires no additional working parts, motors or controls. The new tilt operates through a vertical cam nine in. in height, bolted to the lower front of the truck's mast. As the fork carriage is raised the cam pushes the lower carriage roller forward, tilting the entire carriage and raising the front end of the forks proportionately. Maximum tilt is maintained over three in. of the cam where it is the thickest. In standard position this tilt begins when the heel of the forks is six in. from the floor. Height of tilt, however, may be varied from three to 12 in. above the floor by adjusting the position of the cam.

Completely electric powered, the Transtacker has a non-skid drive tire that is standard equipment. Also, improved weight distribution is said to provide better traction on the drive wheel. Road clearance has been raised 2 in., now being 4 5/8 in. Shorter distance from the center line of the truck's drive wheel to the fork face affords better operator vision. For operating convenience the Transtacker features a new repositioned hydraulic release lever and new push button controls. A new hydraulic-lift motor and pump—a direct connected integral unit — replaces the former separate motor and chain driven pump.



Transtacker automatic tilt

Capacity of the Transtacker is 2,500 lb for a 36-in. load, or 2,000 lb for a 48-in. load. Lifting height of the forks is 64 in. and overall height 79 in.

J-115—Eight-Station Indexing Machine

The Davis & Thompson Co. of Milwaukee, Wis., has added to its line a multiple-operation, eight-station indexing type machine adaptable to a wide range of metal working operations, known as the Model VSI.

The illustration shows a machine that drills, reams and chamfers a 1.281 in. hole and saws slots in both ends of front suspension spindle support arms. The work circle of this machine is 80 in. with an 88 in. dia table. This work table is mounted on a ball-bearing race having an external micro adjustment for table clearance. Indexing of the table is accomplished hydraulically by a fluid motor through a worm and worm wheel. A hydraulic oil reservoir is located in the base of the machine. Drill heads are individually counter balanced units, hydraulically operated for rapid advance, feed, and rapid return. An auxiliary coolant system can be added where required. Design of the column is such that the number of stations required for a specific job can be provided. The electrical system provides complete operator control for both manual or automatic cycling.

Where long work pieces require a higher table so that operations can be performed on ends, such as flanged automobile axles, proper table height can be furnished. A chip trough around the machine makes it possible to remove chips at a central point through the use of an automatic chip scraper.

This machine is approximately 9 ft in diameter and 15 ft in height.

Production of front suspension spindle support arms is 180 net per hour at 80 per cent efficiency. Material is SAE 5135 Brinell 300-340.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

J-116—Engine-Driven Portable Welder

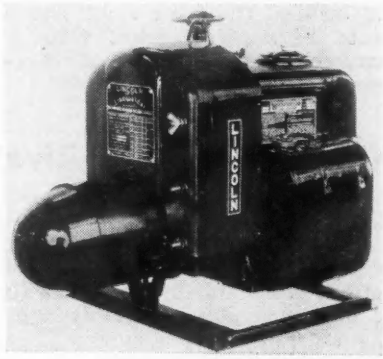
A complete, light weight portable welder of the gasoline engine-driven type, is offered by the Lincoln Electric Company, Cleveland, Ohio. This 180-amp welder, known as the "Lincwelder", is of compact design, roughly two ft wide, two ft high, and four ft long.

With a current range of from 20 to 180 amp, the machine can be used for the welding of light or heavy gage metal, for the repair of cast iron structures, etc.

Provision is made on the output panel for three ranges of output current, continuous adjustment within these ranges being obtained by means of a simple speed control.

Generator controls are mounted inside an enclosed cabinet about the generator, and cooling is through a fan mounted on the generator shaft.

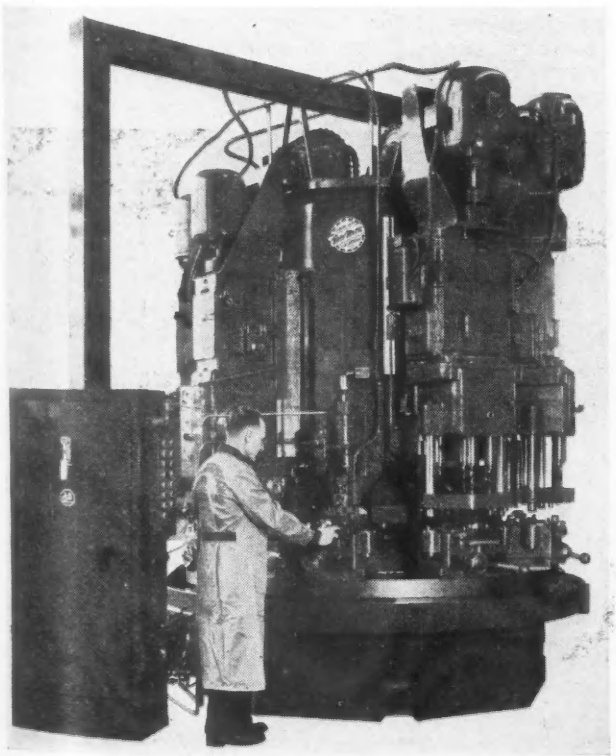
The welder is powered by a Wisconsin air cooled two-cylinder engine. Shrouds around the engine fan and cyinders direct the cooling air. The speed of the engine determines the welding current which is controlled by adjusting the engine speed between a maximum of 2300 rpm (13 hp) and 1800 rpm (11 hp).



Lincoln portable welder

Equipped with a three and one-half gallon capacity gasoline tank, the unit will operate under normal welding conditions for approximately six hours before refueling.

Net weight of the new "Shield ARC Jr." engine-driven welder is 502 lb.



Model VSI, eight-station indexing machine made by Davis & Thompson Co.

J-117—High Speed Marking Device

Sheet and strip marking up to 2000 fpm and a complete die change in 30 seconds are possible with a new "Master Marker" automatic printing machine recently developed by the Pannier Corp., Pittsburgh 12, Pa.

The new marking device prints all materials of any thickness. Mounted and positioned on an overhead crossbar by adjustable set-screw collars, it is motivated by a friction-drive, Alemite-lubricated, roller bearing wheel with a 30-35,000-mile-life rubber tire. The wheel is driven by either the product or conveyor (wheel need not ride on product) at production speed. A full counter-weight is mounted on the wheel axle.

The new machine retains the Pannier brass-back dies used in all such equipment since 1936. The complete die is held by a spring pin for quick and easy changing. One or two dies may be used—at any spacing re-

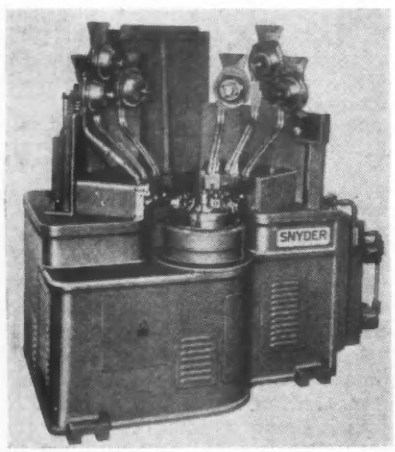
Pannier Marking Device

quired. Die pressure is adjustable and remains constant despite product irregularities. The felt ink roll has enclosed bearings, is inked from the face, and is adjustable to die thickness.

J-118—Automatic Rivet Inserter

A new machine, designed and built by Snyder Tool & Engineering Co., Detroit, automatically inserts 12 rivets in an automotive wheel assembly. The wheel assembly is located on the fixture and thereafter the operation is entirely automatic.

Six automatic feed hoppers are provided which feed the rivets down



Snyder rivet-inserting machine.

to the wheel assembly where hydraulically actuated plungers pick the rivets out of the hopper chutes and carry them into the pierced rivet holes in the wheel assembly. Six rivets are inserted simultaneously. The wheel assembly is then automatically indexed 180 deg and six more rivets are inserted, completing the assembly cycle for one unit.

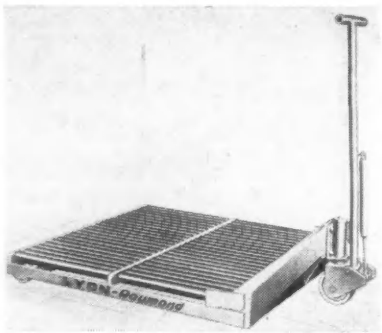
Production is 200 wheel assemblies per hour at 80 per cent efficiency. Floor space required is approximately 45 in. by 57 in.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on any page 56

J-119—Special Roller Platform Truck

Lyon Raymond Corp., Greene, N. Y., has introduced a method of loading pallets inside a freight car and transferring them to a roller conveyor for movement to a warehouse. Empty pallets are placed on a special



Lyon Raymond pallet switcher

truck having rollers instead of a conventional platform. This truck can be moved about inside a freight car or motor truck so that palletized loads can be made up from goods being received.

When the pallet is loaded, the truck is moved to the doorway where a conveyor is set up leading to the warehouse. One side of the truck is lined up with the end of the conveyor and the pallet is pushed on the conveyor system which carries it to the warehouse floor. There it can be handled and stacked by conventional fork trucks.

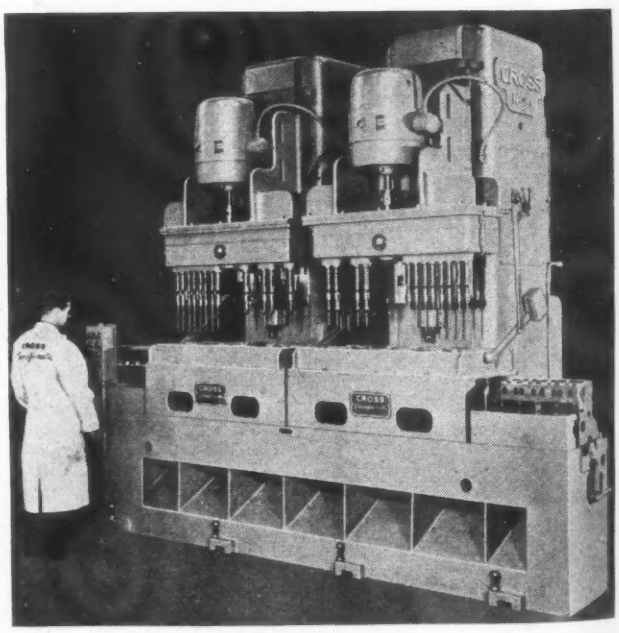
J-120—Transfer-matic For Cylinder Blocks

A special machine tool which combines four finishing operations on automotive cylinder blocks has been developed by the Cross Co., Detroit.

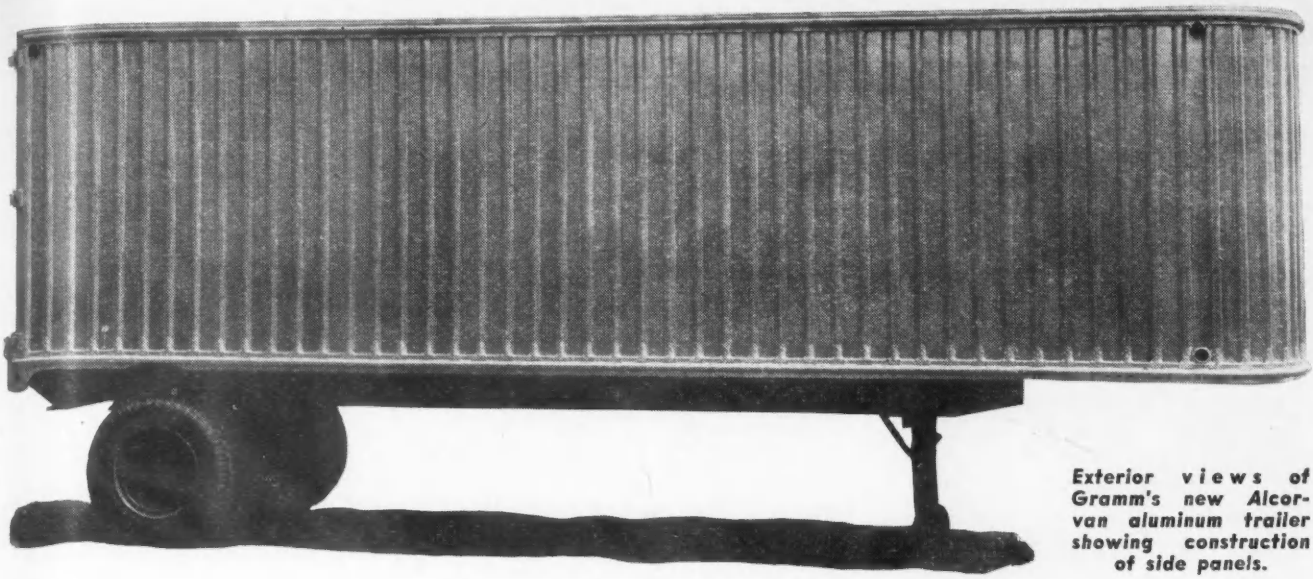
The new machine is a Transfer-matic—Cross' name for its special machine tools equipped with a continuous automatic material handling device. It was designed to permit maximum production with a minimum of physical and mental effort on the part of the operator. A total of 64 pieces per hour are finished at 80 per cent efficiency, according to the manufacturer.

Four cylinder blocks are progressively cut at one time. At the first station, eight valve guide bushings are rough reamed; at station two, four exhaust valve insert parts are counterbored; at the third station, four intake valve seats are formed; at the fourth station, the eight valve guide bushings are finish-reamed.

Mechanical features include a single-lever cycle control, hardened and ground steel ways, hydraulic feed, rapid traverse, and simplified maintenance through the extensive use of duplicate standard Cross units. Conveyor connections are provided for bringing parts up to the machine and for taking finished pieces away. Transfer, locating, and clamping are all handled by automatic power.



Cross Transfer-matic for machining operations on cylinder blocks.



Exterior views of Gramm's new Alcorvan aluminum trailer showing construction of side panels.

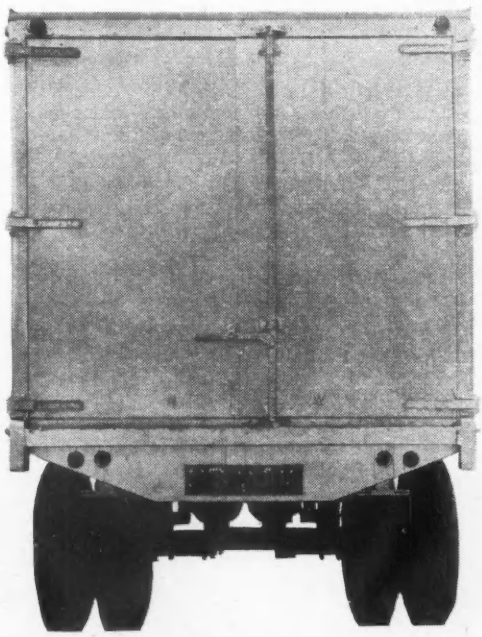
Gramm Introduces First Model of Aluminum Trailer Series

IN announcing its new Alcorvan Model, first in a Payloader series of lightweight aluminum trailers, Gramm Trailer Corp., Delphos, Ohio offers to fleet operators the ability of increasing useful payload, within legal weight limits, by almost a ton. These trailers are available in 24, 26, 28, 30, and 32-ft lengths, with open or closed top, and with square or oval front depending on the customer's requirements.

These models will be available with Timken axles for single-axle jobs and the Gramm tandem axle where tandem axles are specified. Air or vacuum-power brakes will be supplied. The first unit in the line—a 28-ft body with closed top and oval front—has a certified weight of 6530 lb complete with Timken axle, 16½ x 6 in. vacuum power brakes, plywood panel lining, and standard oak flooring. This represents a weight saving of at least 1800 lb compared with a standard Gramm all-steel body trailer.

The Alcorvan body is constructed with corrugated aluminum sheet for side panels, front and rear panels, and aluminum doors and roof panels. The roof rub rail and sill rub rail are the same as used in the standard steel bodies so as to afford the same order of strength and rigidity. Corrugations of the skin surfaces are on seven-in. centers—as compared with 10-in. centers for steel panels—to afford additional strength and stiffness as body columns.

In this construction the skin and roof are made load-carrying members, transmitting load into the roof and sill rub rails and from the latter into the steel frame through four large outriggers on each side. To promote efficient transfer of load to the sill rub rail, each corrugation is connected to the rub rail by means of a formed aluminum "patch" or gusset with four aluminum rivets at the corrugation and three in the rub rail. In addition, the flat area between the corrugations is riveted into the aluminum structural angle running longitudinally inside the body. It is claimed that the combination of seven-in. center corrugations and the plywood inner lining produces exceptional strength and rigidity, comparable with a conventional framed body structure.



Back view showing rear doors.

Basically, the frame and (*Turn to page 78, please*)

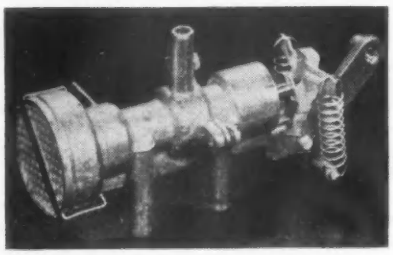
NEW ★ PRODUCTS

For additional information regarding any of items, please use coupon on page 56

K-123—Two New Bendix Products

A new control valve for use with the Bendix two-speed rear axle power unit has been developed by the Bendix Products Division, Bendix Aviation Corp. at South Bend, Ind.

This valve, which is said to be an improvement over previous types, consists of a two-piece valve body with built-in air cleaner, a spring loaded shaft with large poppet valves and an actuating lever designed to

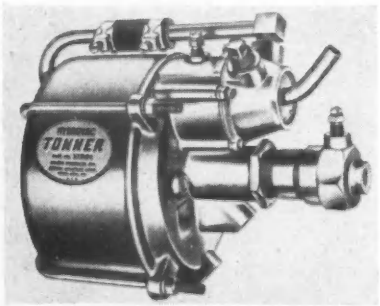


Bendix Control Valve

be connected by a cable to a button or latch on the gear shift lever knob.

Of the remote control type, the valve may be located in any position, but is usually placed on the engine side of the dash. One line is connected to the vacuum source and two lines, to a power chamber, which is incorporated into the two-speed axle. A connector is provided on the operating lever of the valve to furnish mechanical control of the speedometer shift if desired.

Advantages claimed by the manufacturer include compactness, and



Bendix "Hydrovac"

long life without leakage. The vehicle driver is said to have better split gear ratio control because, with the operating button or latch located on the gear shift lever, only one hand is required to select and shift into any combination of gears.

Another new development is a Hydrovac that has been added to the Bendix line of vacuum power brakes, and identified as the "Tonner Model". This new Hydrovac has been specifically engineered for light trucks, that is, for vehicles in the 1/2, 3/4 and 1-ton payload class.

It is pointed out that light trucks, particularly when carrying overloads, require considerable pedal pressure, even more, it is claimed, than heavy-duty trucks which are equipped with vacuum power braking.

The Tonner Hydrovac is said to bring light trucks the same ease of pedal effort and shorter stopping distances that have long been standards of safety on the heavy haulers.

K-124—Waukesha Diesel Engine

The Waukesha Motor Co., Waukesha, Wis., has placed on the market the Model 6-LRD Diesel engine, adaptable to oil well drilling, cotton gins, logging, stationary irrigation, and electric power generation as well as semi-portable construction equipment.

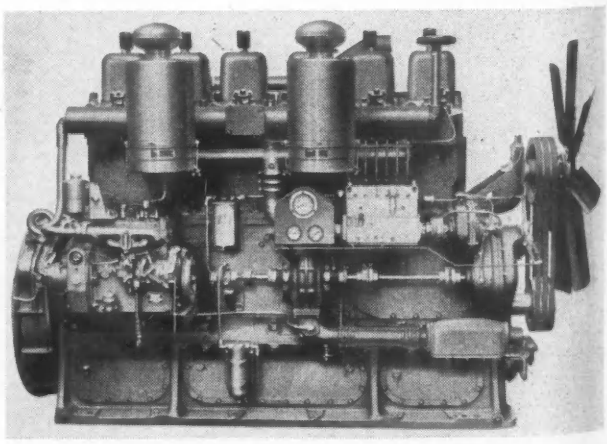
The stripped engine is rated at 300 hp at 900 rpm, or as a complete radiator cooled power unit, at 281 hp at the same speed. Maximum output of the stripped engine is given as 330 hp at 1050 rpm, and of the power unit, 301 hp at 1050 rpm. The engine is 8½ in. by 8½ in. bore and stroke, six cylinders, with a displacement of 2894 cu in. This is the size of the Waukesha Model 6-LRO gas engine.

The Diesel engine, Model 6-LRD, while it occupies approximately the same space as its gas engine counterpart, is entirely new from the crankshaft up. A large seven-bearing 5½ in. graphitic steel crankshaft is used, which is heat-treated and hardened to give crank pin and main journal hardness of 75-90 scaleroscope index. The cylinder block is a one-piece casting into which are inserted the six hardened wet cylinder sleeves, held in place by individual cylinder heads and head gaskets at the top, and the usual synthetic plastic rings at the base. Cylinders are of a special hardened alloy which tests 400 Brinell.

The pistons are cast iron with six rings—four non-sticking wedge type, and two straight side oil-control rings. A feature of the piston is the cooling of the piston crown by intermittent circulation of oil under pressure from the lubricating oiling system. Oil is led into the cavity beneath the piston crown through the oil ducts in the crankshaft, up the rifle-drilled connecting rod into the hollow piston pin. Through the piston pin, the oil is carried by a special duct communicating with the bearing boss and leading into the piston crown cavity. On the opposite side is a similar duct which terminates at the lower end of the piston in an opening normally sealed by the cylinder wall. As the cavity is filled on the up-stroke of the piston with fresh cool oil, it is retained to absorb the heat of combustion until the piston descends when the release passage registers with a slot at the bottom of the cylinder skirt and the hot oil is forced out by the pressure of the cool oil, replacing it from the engine's oiling system. A restriction is placed within the cavity to speed up the movement of the oil on release, so that at the bottom of each stroke of the piston the underside of the piston crown is scoured by the fast moving oil escaping.

The Waukesha Diesel combustion chamber is one of the most important of the Diesel features. This combustion chamber provides unusually lively, responsive acceleration; freedom from shudder and vibration; clean burning; ability to make use of fuels in a wide cetane range; and high fuel economy, according to the manufacturer.

The engine as a power unit is equipped with large-capacity, waste-packed oil filters, large capacity fuel filters, built-in governor, American-

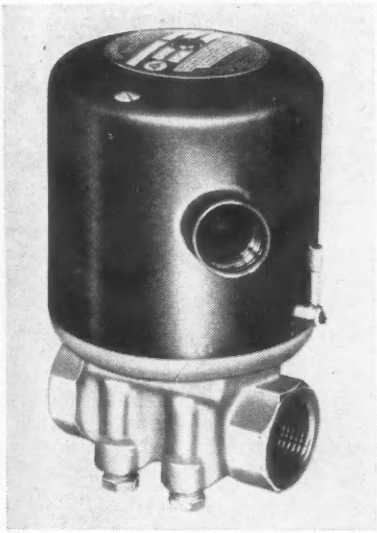


Waukesha Model 6-LRD Diesel engine

Bosch injection system, and when so desired, can be equipped with an individual gasoline engine mechanical starting system. Flywheels and housings ranging from SAE 00 to 1 are available, as well as clutches, slide rails, safety shut-down and other accessory devices.

K-125—Magnetic Gas Valve

The new K-3H hermetically-sealed, magnetic gas valve recently added to the line of General Controls Co., Glendale 1, Calif., combines design and operational features to eliminate the possibility of gummy or foreign matter forming in the solenoid and restricting plunger operation. A diaphragm construction seals the operator from the fuel gas without interfering with valve operation. The



General Controls magnetic gas valve Type K-3H

solenoid operator is completely sealed to atmosphere and in event of diaphragm rupture prevents all external gas leakage. The K-3H closes automatically upon current failure.

The K-3H valve opens and closes a gas fuel supply line in response to room thermostats, limit controls or similar devices. This valve is adaptable to gas-fired boilers, industrial furnaces, and conversion burners; and is available in sizes from 3/8 in I.P.S. to 1-1/4 in. I.P.S. inclusive.

The K-3H is suitable for natural, manufactured, mixed, and all commercial liquefied petroleum gases.

A lever-type manual opening device permits setting valve in open position in event of current failure. The same lever may be used to manually close the valve at will. Upon resumption of current an electric trip automatically returns the valve to the normal control of the thermostat or limit controls with which it is connected.

NEW ★ PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

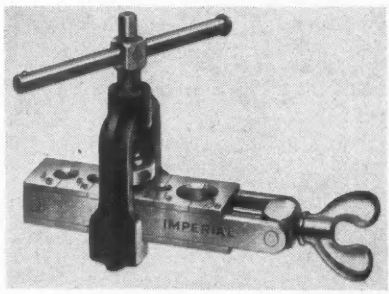
K-126—Fused Fabric Brake Lining

An entirely different type brake lining has just been brought out by the Russell Mfg. Co. of Middletown, Conn. Called Fused Fabric, it is not woven, molded or wire back, but is a completely new especially processed frictional material. It utilizes a greater number of strands of reinforced asbestos, and permits these strands to be completely permeated with treatment. When subjected to heat and high pressure, these permeated strands produce a uniform material with a density of 190 lb per cu ft.

According to the manufacturer, "grab" and "fade", when wet or damp, are reduced to a minimum because Fused Fabric brake lining is water repellent. Moisture remains on the surface where it is quickly dissipated by heat, permitting almost immediate braking recovery.

K-127—Heavy Duty Flaring Tool

Faster operation, better flares, greater compactness and elimination of scoring of the tubing are among the advantages listed for the new



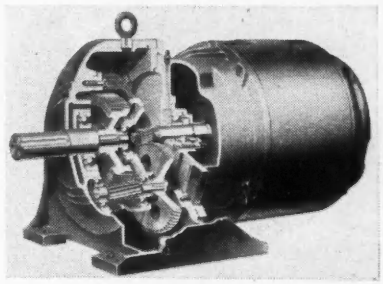
Hi-Duty flaring tool

Hi-Duty flaring tool recently introduced by the Imperial Brass Mfg. Co., Chicago. The tool flares soft copper, brass and aluminum tubing for S.A.E. flare joints in 1/4, 5/16, 3/8, 1/2-in. and 5/8-in. OD sizes.

In place of the usual bar it has a new die holder with sliding dies for clamping the tubing. There is only one thumb screw at the end to tighten. Friction is reduced through the use of a ball thrust bearing. The yoke slides directly over end of die holder without twisting or turning into position over tubing to be flared. Elimination of scoring is said to be made possible by the extra depth, smooth surface die blocks which hold the tubing securely without scoring it.

K-128—Compact Gearmotor

A completely new compact gearmotor will be produced jointly by the Reliance Electric & Engineering Co., Cleveland, Ohio, and the Philadelphia Gear Works, Inc., Philadelphia, Pa. To be built in six basic sizes or diameters capable of delivering from 1



Cut-away view of Philadelphia-Reliance gearmotor

to 60 hp, the new helical type horizontal units are complete integral a-c or d-c motors with flange mounting, and operate in a speed range from 7½ to 780 rpm. Single, double, and triple reduction units will be available in each size. A number of enclosure types, including protected open, splash-proof, drip-proof, totally enclosed non-ventilated, totally enclosed fan-cooled, Underwriters' Class I-Group D, Class II Groups F and G, and Bureau of Mines' can be bolted to any of the gear elements without alteration.

A single reduction unit comprises a cast housing bolted to a Reliance motor, the latter having feet and supporting the gear housing. The output shaft is located centrally and above the feet of the motor. Splash oil lubrication is provided for the helical pinion and gear. In the double reduction unit, the feet are cast integral with the gear housing. The output shaft is mounted in anti-friction bearings. A footless Reliance motor is bolted directly to the reducer.

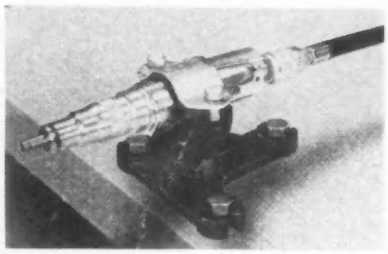
The three-stage gearmotor is assembled by adding a single-stage reduction assembly bracket to the two-stage gearmotor. On the multi-stage gearmotors, only a bearing separates the output shaft and the feet of the gearmotor.

K-129—New Tool Mounting Fixture

A new tool mounting fixture, Model 7101, for all types of portable tools, is announced by the Aro Equipment Corp., Bryan, Ohio.

The fixture is suited to many screw driving and nut setting jobs where it is more practical to bring the assembly to the tool. This mounting fixture is adjustable to any position. In many applications, production can be increased because the operator has use of both hands. Assemblies can be handled easier and quicker with the tool mounted in this new bench fixture, it is claimed.

The fixture will accommodate Aro air tools from the small size drills, grinders, screw drivers, etc., to the large ½-in. drill. It is also suited for all electric tools. Many grinding and burring jobs can be handled faster and easier with the grinder in a fixed position. Drilling and reaming jobs,



Aro mounting fixture for portable tools

screw driving and nut setting, rotary file work, and numerous other production jobs can be handled by use of this fixture.

The clamp for holding tools is designed to accommodate various diameters. All adjustments can be made with standard end wrenches. The unit is furnished complete with lag bolts for bench mounting and pad for tool.

K-130—Air Starters for Engines

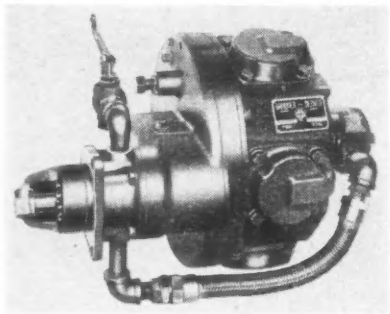
News of a new line of air starters for gas, gasoline or Diesel engines—including five sizes, developing from 3 to 15 hp on 100 pounds air pressure—has just been released by Gardner-Denver Co., Quincy, Ill.

The high torque characteristic of the piston type motor, it is said, makes it especially desirable for Diesel applications involving high starting loads, while the five-cylinder radial design provides even torque through the operating cycle.

An exclusive feature claimed is an air-actuated starter pinion which, when the air valve is open, automatically engages the ring gear a split second before the starter begins to crank the engine, thus assuring positive, safe engagement.

NEW ★ PRODUCTS

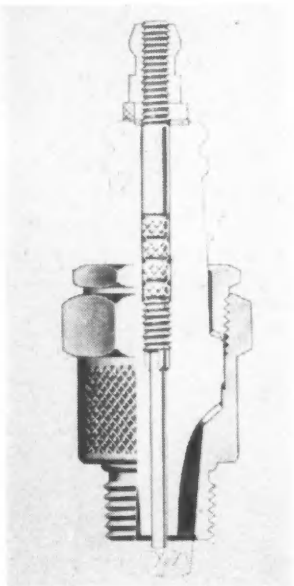
For additional information regarding any of these items, please use coupon on page 56



Gardner-Denver air starter

K-131—Spark Plugs in Five Heat Ranges

The V-Gap Spark Plug Corp., Monrovia, Calif., is now in production on its line of spark plugs which will be



New V-Gap Spark Plug

manufactured in 18 numbers of 5 heat ranges. It is claimed by the manufacturers that the 18 numbers will cover all service applications for the more popular installations.

Some of the special features advanced in favor of the new V-Gap spark plug are: a two-piece steel shell, permitting the use of two or more copper gaskets to lock the plug airtight; oversize porcelains which are set at 35 lb ft of torque on the gland nut; large center electrode wires with knurls which provide an irregular, machined surface for sealing the electrode wire to the porcelain; a copper seal for fast heat dissipation of the lower electrode wire; a V-gap ground wire the construction of which is said to promote self-cleaning of carbon deposits; and dual sparking action of the channel.

K-132—Truing Attachment for Lathes

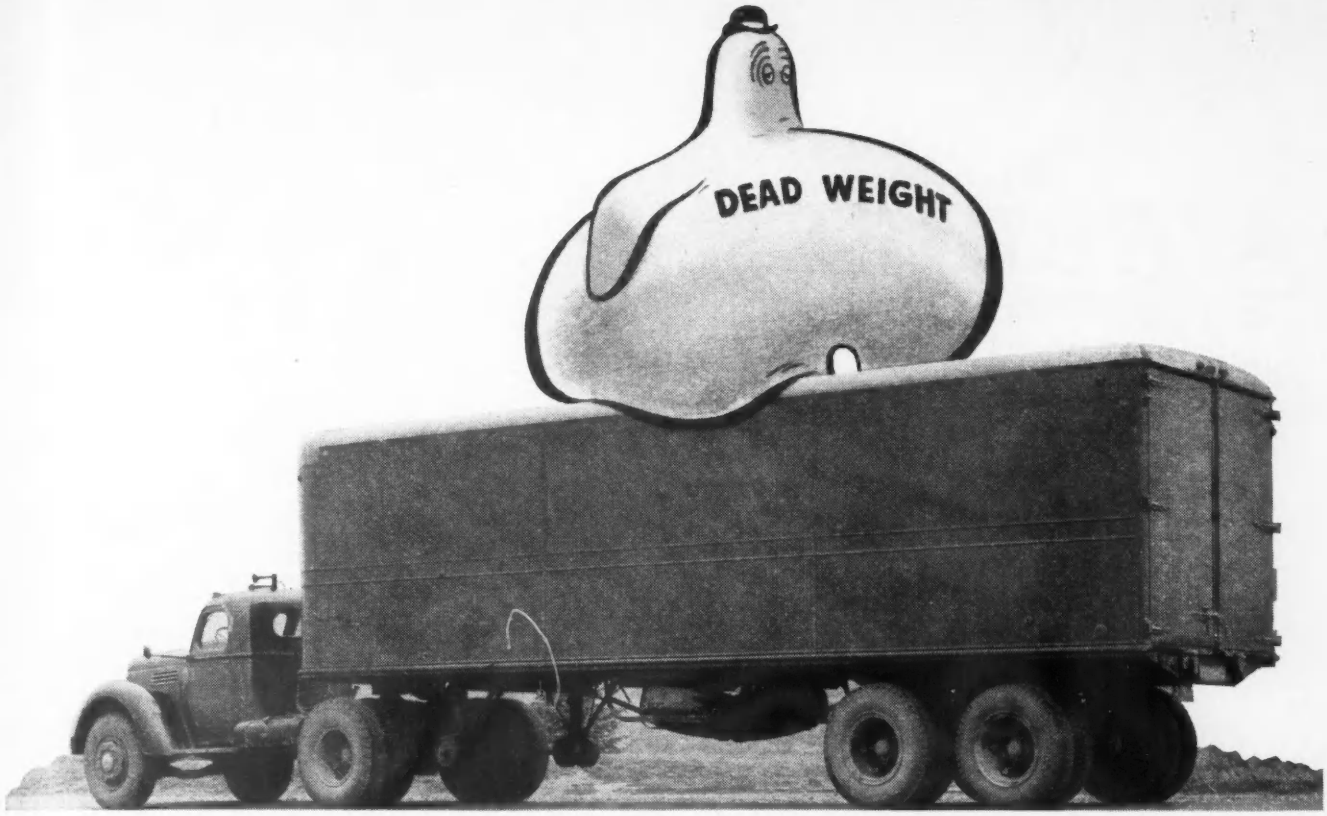
A new automatic truing attachment adaptable to toolroom and production lathes has been placed on the market by the Chas. E. Chapin Co., East Rutherford, N. J. The Chapin Auto-Truer is designed for use with universal self-centering chucks, independent chucks, face plates and special fixtures.

The Auto-Truer consists of a back plate 5, 7¼ or 9 in. in diameter, threaded to fit the lathe spindle, and a radially movable front plate of the same diameter, threaded to receive the chuck. The front and back plates are locked together by a clamping ring which, by means of three hex locking bolts entering from the front plate, acts as a vise to lock the front plate and chuck into alignment after concentricity has been obtained. When unlocked for centering, the front plate is held in frictional contact with the back plate by means of springs, thus permitting the front plate to move radially with relation to the back plate.

K-133—Fabrics From Glass-Covered Yarn

The B. F. Goodrich Co., Akron, Ohio, has just made available a variety of fabrics woven of yarn covered with Koroseal film. Present production is limited to fabrics woven with glass yarn as the core, but the yarn may also be braided or crocheted. The combination of the glass yarns and Koroseal is claimed to permit current fabrics to pass any flame-resistant specifications now in existence. The core of the yarn is free throughout with no adhesion to the coating, in order to add to flex life. Each core is double wrapped with the Koroseal covering and then heat-sealed throughout its entire area, eliminating all pin holes into which moisture could penetrate.

Presently offered in nine pastels and black and white, fabrics made of Koroseal coated yarns have particular application for seat coverings in automobiles, buses, and airplanes. Two important characteristics of the fabrics are claimed to be their porosity or ability to breathe, and their excellent drape.



Are You Giving Him a Free Ride on Every Trip?

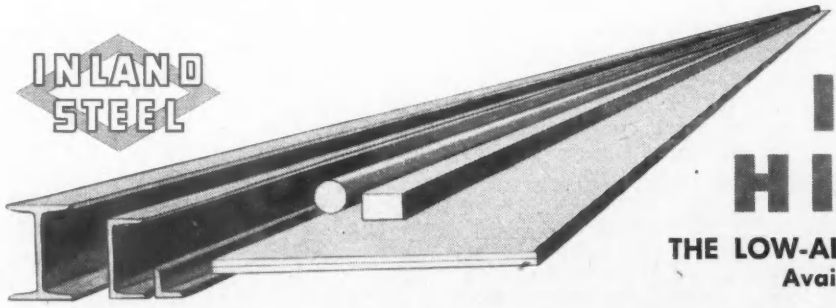
Inland Hi-Steel's High Strength-to-Weight Ratio Reduces Dead Weight — Increases Payloads

If you're looking for a way to cut operating costs on trucks and buses, look to Inland Hi-Steel. This remarkable low-alloy steel has nearly twice the yield strength of ordinary structural steel, and stands up 50% better under dynamic loads. Because lighter sections can be used without sacrificing strength, Hi-Steel decreases the weight of your equipment. Thus, payloads can be substantially increased, braking loads reduced, and operating costs lowered.

Hi-Steel has other advantages, too. It has about five times the corrosion resistance of ordinary steel, and is far more resistant to abrasion. It can be worked hot or cold, with little or no change from standard shop practice.

To make larger tonnages available to you, other companies are licensed to make Hi-Steel. Write for Bulletin No. 11. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, and St. Paul.

Hi-Steel meets the requirements of SAE Specification 950



INLAND HI-STEEL

THE LOW-ALLOY, HI-STRENGTH STEEL
Available in Many Forms

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By ROBERT McLARREN

THE DIRIGIBLE AGAIN

Senator Owen Brewster (R., Me.) has introduced a bill to authorize the construction of two 10,000,000 cu. ft. dirigibles costing $50,000,000 over a five year period. The bill would transfer cognizance of the program from the Navy Bureau of Aeronautics to a special new department in the Maritime Commission. Maritime has already indicated that it is not enthusiastic about the idea, having no qualified men to consider such a program or to administer one if launched. The program is heartily endorsed, however, by C. E. Rosendahl, retired Navy director of lighter-than-air and by Paul W. Litchfield, Goodyear president and the only serious contender for the construction job. Purpose of the bill is to develop a trans-Atlantic passenger or cargo craft along the lines of American flag steamships built by the Maritime Commission. Although few engineers argue with the economy, smoothness and load-carrying capacity of the giant craft, the services see no tactical use of them and no private commercial companies have the funds to support such a venture.

COMMERCIAL JET

The first U.S. commercial jet engine, the Allison 400-C4, has been awarded a Civil Aeronautics Administration approved type certificate authorizing its installation in commercially licensed and operated transport aircraft. This is the first commercial jet engine in the world, the British having no equivalent engine certification system. The jet engines passed the standard reciprocating engine type test without any special deviations. Certification of the engine leads to speculation regarding its initial commercial installation and three companies — Douglas, Boeing and Lockheed—are known to be examining several designs for possible development. Douglas is believed to be furthest along with its project. It is generally conceded that no existing transport could be modified satisfactorily to take jet engines on any other than strictly an experimental test basis. Although several designs are admirably suited by configuration to accommodate jet engines, notably the Republic Rainbow and the Convair Liner, the major problem is the excessive thrust loads that would be generated by the 4000 lb. thrust power of the jet engine. Britain is well ahead in this phase of the race and will be flying a genuine jet transport before the end of the year.

GOVERNMENT TRANSPORT

It is now certain that the U.S. government is going into the business of designing and developing commercial transport aircraft, thereby solving the growing industry dilemma. The airlines cannot underwrite the creation of a new transport plane; the industry cannot create a new transport plane unless its development costs are underwritten. The government will step into this breach with the necessary cash but with all its accompanying red tape. Air Force wants a military cargo plane adaptable for airline use; Civil Aeronautics Administration wants a commercial transport adaptable for military use. The government hopes to solve this impasse in its standard solution to such problems by creating a board! But the board would have one man each from Air Force, Navy, CAA, Civil Aeronautics Board and the National Advisory Committee for Aeronautics: three civilians against two military members! Before such a board had even been created the obvious arguments started: feeder lines want a small, twin-engine design of 9-12 passenger capacity—Air Force has no use for such a small transport; Air Force wants high-performance, heavily load-factored cargo plane. Scheduled airlines want no part of such an uneconomical type. And wait until the battle starts over jets, turboprops, quadricycle landing gear, pressure cabins, cruising rpm, operating range, etc., etc. For and advanced history of the next year in this debate we suggest you study the British Air Ministry's airplane planning committees deliberations with constant reference to current British transport aircraft and those to be flown this year! Perhaps we will yet see an answer to the problem of where planned progress leaves off and planned disaster begins.

RECIPROCATING FUTURE

Again and again we are warned not to write off the reciprocating engine and comes now another promising development—the variable discharge turbo—that contains the seeds of an even expanded future for the piston engine. The amount of waste heat that is dumped overboard through a turbosupercharger is all too well known and the compound engine (in which the turbo is geared back into the engine shaft) is one interesting method of recapturing this energy. The VDT system accomplishes this far more simply, thus avoiding the already costly development period of the compound engine. The VDT system simply adds a variable area nozzle to the turbo to transfer waste gate gases into usable thrust. But control of this nozzle is a complex problem now the subject of at least one major Air Force research and development program. However, a specific fuel consumption of the order of 0.35 lbs/hp/hour, of which the VDT engine is said to be capable, is assuredly a target worth expending some ammunition on. Such a reduction would give a bomber a range increase of about 25% over current propeller-driven types and transform current 8000-mile craft into the long-awaited 10,000-mile design.

FLYING BOAT

Multi-engine landplane reliability has erased the flying boat hull safety margin in over-water operations but it has not threatened the utility, economy and capacity of the boat as a cargo carrier. Wartime development of the "planing tail hull" by the National Advisory Committee for Aeronautics has widened the gap substantially by giving the flying boat the performance of the landplane. Thus—the brightened outlook for the type. Navy Bureau of Aeronautics has revealed two large-size projects designed to prove the point. The Martin XP5M-1 is already flying and the Convair XP5Y-1 powered by turboprop engines will be flying next spring. Both of the huge craft feature the new hull shape which consists, essentially, of planing surfaces continued to the extreme aft end of the hull, rather than cut short midway aft, as on flying boats for the past 40 years. The hulls are also of increased length-beam ratio further reducing air drag. Off the water faster with heavier loads and cruising at speeds comparable to the landplane, the new flying boats promise virtually a new era in overwater civil and military transport.

Before ... YOU TUNE-UP MECHANICALLY TUNE-UP CHEMICALLY!

Before you tune-up an engine, make sure it is "Chemically Clean". Just add Permatex Toon-Oyl to crankcase oil, warm up engine and let it idle. Sludge and carbon-gum binders that interfere with the smooth operation of valves, piston rings, oil lines and oil screens, will be loosened, disbursed and dissolved!

Then, you'll have a "Chemically Clean" engine, ready for your accurate mechanical adjustments!

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PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-146—High Nickel Alloys

The International Nickel Co., Inc. —66 Practical Ideas for Metal Problems In Electrical Products is the title of a new booklet listing many stories showing how electrical manufacturers have used high nickel alloys to overcome corrosion, heat, vibration fatigue, wear and other performance hazards. The thirty-six pages of the booklet cover special operational problems such as high temperature, corrosion, formability, abrasion and many others commonly confronting the electrical engineer and designer. Approximately one hundred photographs illustrate the booklet.

H-147—Welding Rods

Eutectic Welding Alloys Corp.—An illustrated, 4-page bulletin, Here Is Your Information, contains concise, information on welding rods for use in every shop. The bulletin is arranged according to metals and lists those rods which are designed specifically for each metal application. Listing tensile strength, bonding temperatures, sizes available and outstanding characteristics of each rod, the bulletin is a handy reference for welders.

H-148—Punch Presses

Diamond Machine Tool Co.—Diamond open back inclinable punch presses are illustrated and described with complete specifications and technical engineering data in a new 12-page, 3-color catalog. Blueprint drawings are included of the frame, bed and ram dimensions. Photographs and engineering data on SR-4 strain gage analysis and dynamic tests as applied to Diamond punch presses, are included.

H-149—Hydraulic Presses

Verson Allsteel Press Co.—A new catalog gives full details and specifications for the company's line of hydraulic presses in capacities from 75 to 5000 tons. A detailed description of the new Hydrol Speed Circuit is included.

H-150—Ry-Ax Steel

Jos. T. Ryerson & Son, Inc.—A new bulletin describes Ry-Ax, trade name of a heat treated carbon-manganese hot roller bar steel. Mechanical properties, hardness readings, machinability ratings are given. It lists typical shafting, axle and other uses.

H-151—Stainless Plates

Allegheny Ludlum Steel Corp.—A new booklet Stainless Plates (Solid and Clad) and Their Fabrication is available. Illustrated with photographs, tables and charts, the 32-page booklet is designed to supply fabricators with late and authentic information on the selection and fabrication of both solid stainless steel and stainless clad plates. The booklet is sectionalized for easy reference as a handbook. Initial sections of the booklet are concerned with tables and charts showing available sizes, thicknesses and weights, together with other pertinent data. Following are sections on analysis selection, shop work, cutting, machining, annealing, etc. ASTM specifications of plates are included.

H-152—Microsphere Bearings

Landis Tool Co.—A new 12-page booklet gives information, by means of many line drawings and illustrations, on the basic fundamentals of the Microsphere Wheel Spindle Bearing, used exclusively on Landis Tool Precision Grinders.

H-153—Hydrovac Power Brakes

Bendix Products Div., Bendix Aviation Corp.—Literature announcing the new Tonner Model Hydrovac includes a folder which shows pedal pressure required for braking "before and

(*Please turn to page* 88)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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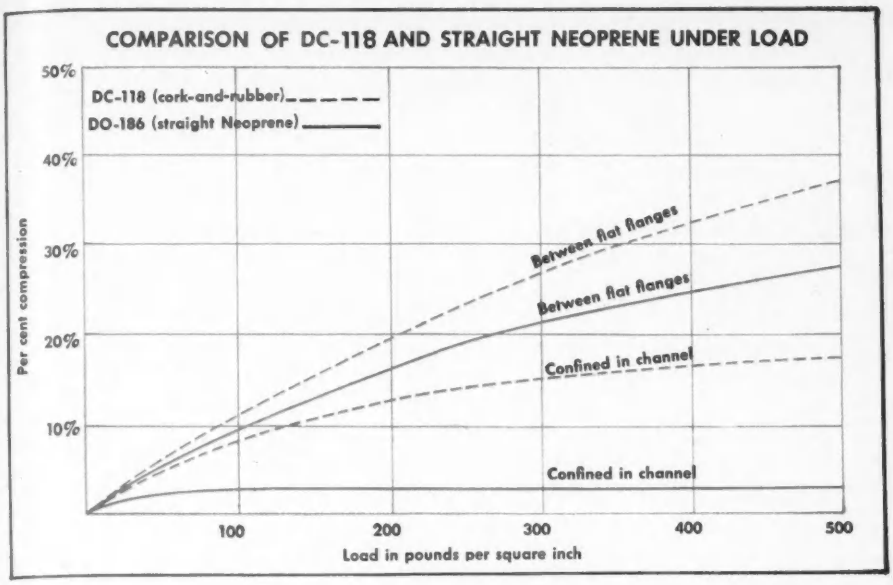

DC-118

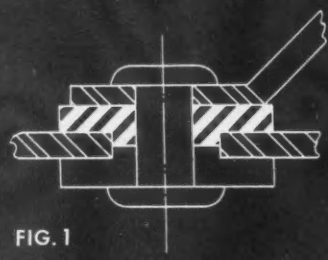

FIG. 1

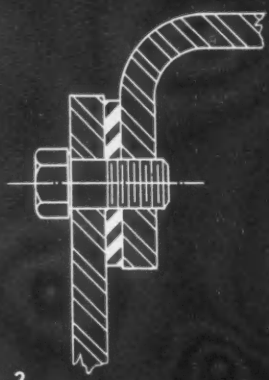

FIG. 2

Figure 1 shows a condenser terminal with gaskets made of DC-118. It seals along the circumference of the rivet as well as across the face of the insulating washer. Figure 2 shows the flange section of a tank. The gasket of DC-118 not only seals between the flanges but also prevents leakage around stud threads.

SEALING WITH ARMSTRONG'S DC-118

1. To prevent leakage both between flanges and along bolt threads

2. To hold light liquids and gasses

Armstrong's DC-118 is a neoprene-and-cork gasket material with unusual balance between compressibility and side flow. It can be used where the properties of neoprene are required but where the normal side flow of rubber-like materials must be controlled. Because such a balance between flow and compressibility frees the design engineer from certain restrictions inherent in non-compressible materials, Armstrong's DC-118 offers a varied range of uses.

1. DC-118 can be used in applications that require a gasket to seal on three sides. It has enough lateral flow to get intimate contact on bolts, rivets, or other parts perpendicular to the flanges, yet its true compressibility avoids excessive extrusion and helps prevent rupture under normally high bolting pressures.

2. DC-118 seals light liquids and gasses under pressure. It has enough flow to fill minor flange irregularities, yet here, too, its compressibility avoids excessive extrusion and helps prevent rupture. Flange distances and bolting pressures may vary within wider limits than where a straight synthetic rubber gasketing material is used.

DC-118 can be used confined on four sides in a channel or held on two sides between flat flanges. Totally confined, it needs less allowance for flow than a straight rubber compound and therefore permits wider dimensional tolerances. As shown in the chart above, totally confined in a channel, Armstrong's DC-118 can be reduced in volume approximately 15%; whereas straight rubber is, like water, practically non-compressible.

DC-118 has good aging qualities. Used for any of the services mentioned above, it maintains good "kickback" pressure. High surface friction insures good blowout resistance. It will seal after repeated making and breaking of a joint. Fluids resistance compares with that of straight neoprene compounds under similar conditions.

While DC-118 will handle a wide range of sealing problems, it may not be the most suitable material for a given application. A whole range of Armstrong's cork-and-rubber compositions is made, each with the same basic characteristics but modified to meet the requirements of various types of applications. We recommend, therefore, that you discuss your needs with an Armstrong Representative. He will suggest solutions to your particular problem and supply test samples of any of the Armstrong gasket and sealing materials listed below.

SEND FOR FREE BOOKLET

Get new 20-page "Armstrong's Gasket and Sealing Materials." It includes specification data on more than 40 of Armstrong's resilient sealing materials and also helpful hints on their proper application. Write to Armstrong Cork Co., Gaskets and Packings Department, 1506 Arch Street, Lancaster, Pennsylvania.

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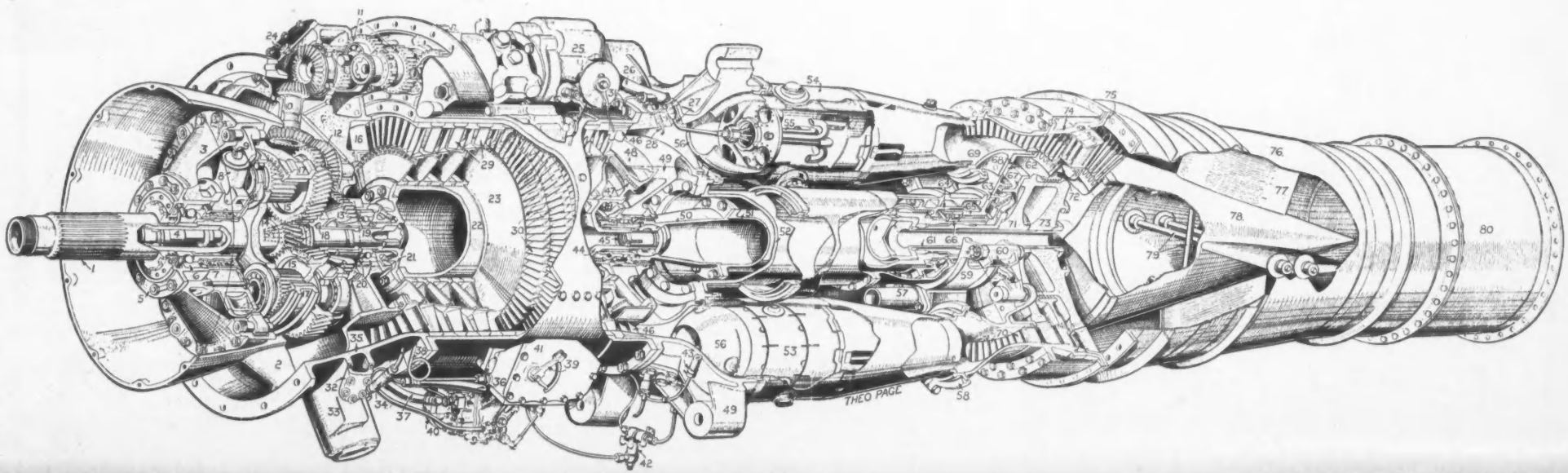
Fiber Sheet Packings • Rag Felt Papers • Natural Cork

Details of British Mamba Turbo-Prop

COMPLETE details of the Mamba turbo-prop engine, developed by Armstrong Siddeley Motors Ltd., Great Britain, have recently been released, and are shown in the cutaway drawing reproduced here. This new power plant, which is designed for aircraft with a gross weight of from 10,000 to 30,000 lb, uses a 10-stage axial-flow compressor, six combustion chambers and a two-stage turbine. The turbine shaft drives a de Havilland or Rotol propeller through helical reduction gearing. Advantages of the Mamba are its low frontal area —less than 30 in. diam. automatic anti-icing equipment, and easy accessibility of auxiliaries. Overall length from rear face of propeller to rear face of turbine is 57 in., and weight including propeller and cowling is 1060 lb. Maximum power developed for take off is 1010 shp plus jet static thrust of 307 lb.

1. Propeller shaft.
2. Air intake body.
3. Front cover.
4. Oil transfer sleeve.
5. Main bearing housing.
6. Main bearing.
7. Main bearing oil seals.
8. Torque meter cylinder block.
9. Torque meter lever.
10. Auxiliaries drive shaft.
11. Drive gears for auxiliaries.
12. Layshaft gear.
13. Sun gear.
14. Satellite carrier (shown dotted).
15. Satellite gear.
16. Inlet guide vanes.
17. Fixed gear.
18. Oil transfer sleeve.
19. Torsion bar.
20. Compressor bearings (2 off).
21. Compressor stub shaft.
22. Compressor drum.
23. Compressor disks.
24. Engine breather.
25. C.S.U. pump.
26. Rear engine cooling pipe.
27. Jet.
28. Thermo couple.
29. Compressor stator blades.
30. Compressor rotor blades.
31. Oil pipe to rear bearing.
32. Drain to sump.
33. Sump filter body.
34. Front bearing oil feed.
35. Stator casing.
36. Control servo drain.
37. Isolator to flow control unit.
38. Feed to control servo pipe unit.
39. Pilot's control lever.
40. Flow control unit.
41. Cam box.
42. Dump valve.
43. Fuel distributor ring.
44. Compressor shaft extension.
45. Locking nut.
46. Straightener blades.
47. Compressor labyrinth.
48. Compressor labyrinth housing unit.
49. Combustion manifold and six-point mounting unit.
50. Compressor shaft extension.
51. Rear main shaft.
52. Center bearing extension.
53. Mixing chamber.
54. Combustion chamber outer casing.
55. Flame tube.
56. Flame tube nose unit.
57. Air to rear bearing.
58. Clamp ring.
59. Rear bearing housing.
60. Link.
61. Turbine clamp bolt.
62. Centralizing clamp plate.
63. Turbine labyrinth.
64. Bearing oil-seal sleeve.
65. Bearing air-seal sleeve.
66. Turbine rear bearing.
67. Turbine stub shaft.
68. Stator clamp ring.
69. Turbine feed manifold.
70. First nozzle blades.
71. First turbine disk.
72. Second inner blade ring.
73. Second turbine disk.
74. Stator casing.
75. Second stator clamp ring.
76. Exhaust cone (outer).
77. Faired cone support.
78. Exhaust cone (inner).
79. Supporting struts (four).
80. Propelling nozzle.



Drawing by courtesy of The Aeroplane (London)

Drawing by courtesy of The Aeroplane (London)

RIES

Our hat's in the ring, too!

Arguments run hot as to who will be the next champion of the people. Sealed Power continues to be the champion of piston rings. Since 1911 leading engineers have agreed on that. Their continued preference decides the championship. Their co-operation has helped bring Sealed Power plants, facilities, and staff to the present all-time peak of excellence. You are invited to use the full resources of Sealed Power to help make your good engines even better.

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SEALED POWER PISTON RINGS

PISTONS • CYLINDER SLEEVES

Observations

By Joseph Geschelin

Scrap High

According to the latest reports we have, many large press shops in our industry are experiencing considerable difficulty with deep drawing sheet steel. The steel industry has plenty of problems and headaches what with getting scrap, with poor scrap high in residuals, and other matters. It should be a source of concern to everyone, nevertheless, that scrap in press shops is said to be running around 14 to 18 per cent.

Packaging Advances

During the war the armed services spent considerable time and enormous expense in the development of export packaging methods to provide assurance against deterioration of machined parts and assemblies. Since then many companies have tackled the problem in an effort to find simpler and less costly methods. We were told recently by one large manufacturer that he has had signal success with a simple wrapping of thin aluminum foil. Finely ground and polished parts, usually subject to rapid rusting, remain unaffected for long periods of time in storage and transit when wrapped in aluminum foil and without any other treatment.

Infra-Red Panes

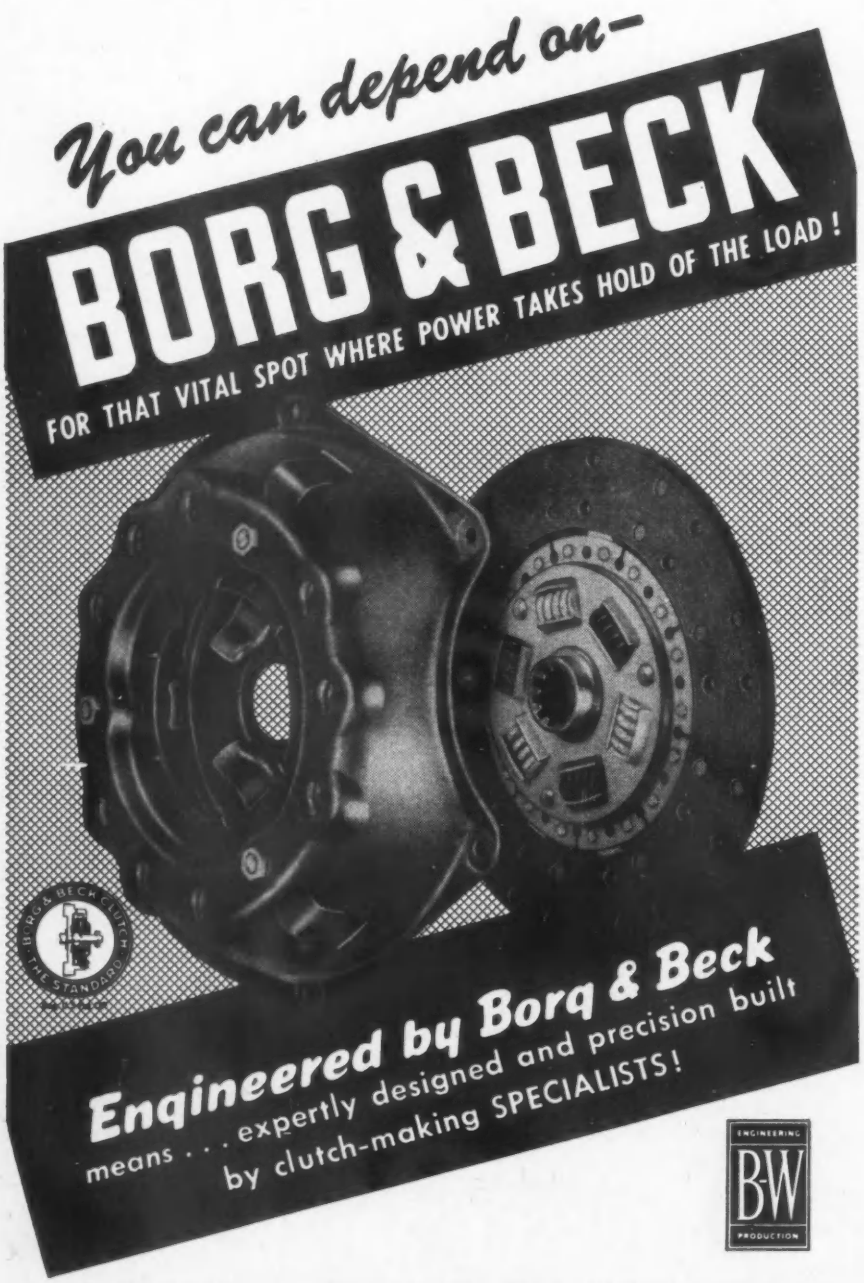
As an experimental project, one automobile manufacturer is offering as special equipment a unique type of safety glass designed to reduce the transmission of infra-red heat rays. This tinted glass is said to be particularly effective in reducing heat in operations in the Southwest. Of course it's not a cure-all. If a car is parked long enough in the sun it will get just as hot as does the conventionally glazed job. Too, the tinted glass reduces visibility to a noticeable degree at dusk or on a cloudy day. But it gives marked relief when driving under usual sunlight conditions.

Military Potential

PARADOXICAL THOUGH IT MAY SOUND, seems to us that the greater the degree of mechanization and automaticity developed in the machine shops of the industry, the less will be their potential undertaking military programs in some distant future. Consider that specialized machinery is less flexible, less capable of changeover—if at all—to the making of a different product. The first line of defense in a military program remains the general purpose machine and certain automatic and semi-automatic machines such as grinders, screw machines, lathes, etc., which are inherently flexible. The fact is that conversion to military programs in the future may realize an even smaller percentage of production equipment in many plants than was possible in the last war.

Sharing Burden

CHATTING RECENTLY WITH THE PRESident of one of the major companies in the heavy durable goods field we listened to a noteworthy recommendation. Perhaps too few have stopped to consider that the design of a large press or transfer machine entails an enormous investment. Moreover, the manufacturers consider it a risk rather than an investment. Yet this engineer-president said his own design department has rudimentary plans for machinery of such advanced nature as to revolutionize the practice of large automotive manufacturers. His concern is that little of this can be realized commercially because development cost is entirely out of proportion to the price tag on the equipment. The answer is subsidy in one form or another from the user.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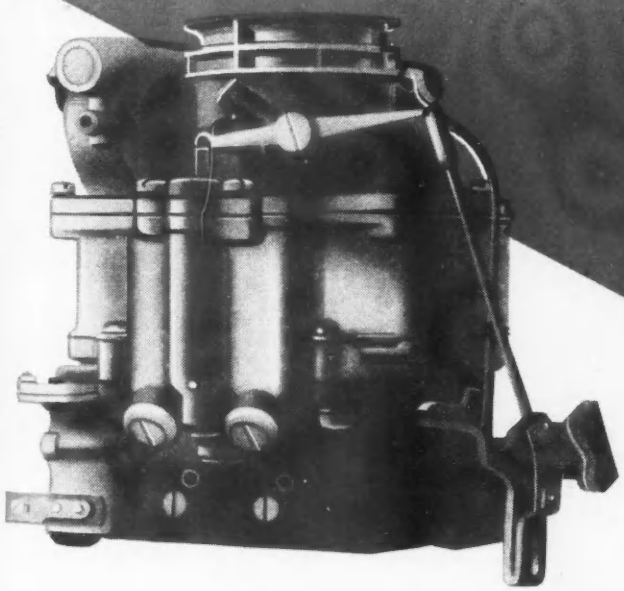

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Personals

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Packard Motor Car Co.—The appointment of **E. G. Patzkowsky** as manger of the new automatic transmission division has been announced.

Buick Motor Div., General Motors Corp.—**Joseph G. Hammond,** Asst. General Mfg. Mgr., will retire after 35 years' service with the company.

Studebaker Corp.—**William Davit** and **Charles M. Edwards** have been appointed Asst. Comptrollers.

Willys-Overland Motors—**E. E. MacGrogan** has been appointed to succeed **D. C. Fabiani,** resigned, as Factory Accountant.

Bell Aircraft Corp.—**Roy J. Sandstrom** appointed Executive Chief Engineer.

Boeing Airplane Co.—**H. Fletcher Brown,** Vice-Pres., has been placed in charge of administering all sub-contracts in the Southern California area.

The Glenn L. Martin Co.—**Jos. C. Little,** elected a member of the Board of Directors, and Secretary.

Tinnerman Products, Inc.—**George J. Schad** elected Treasurer and a Director. **William H. Taylor** appointed Director of Engineering.

The Electric Auto-Lite Co.—**Jos. H. Lambrix** has been named Director of Purchases.

Timken-Detroit Axle Co.—**Charles A. Cook** has resigned his position as Asst. Chief Engineer, Wisconsin Axle Div. Mr. Cook becomes President of the newly organized CKL Machinery Co.

Federal-Mogul Corp.—**Albert B. Willi, Jr.** has been appointed Asst. Chief Engineer, in charge of Sales Engineering.

The Euclid Road Machinery Co.—**D. R. Anderson,** Service Manager, has been appointed Manager of the company's Hibbing, Minn. plant.

Vic Pastushin Industries, Inc.—**Charles Beard** has been appointed General Sales Manager.

Twin Coach Co. — **Earl H. Lenz** has been appointed Director of Engineering.

Jack & Heintz Precision Industries, Inc. — **John K. McNeely,** appointed Special Aviation Project Engineer.

Jack & Heintz Precision Industries, Inc.—**Alfred N. Lawrence,** appointed Sales Manager, Aviation Division. **Walter Koelliker,** Engineer for the Special Aviation Projects Section.

General Electric Co., Chemical Dept—**Edwin M. Shultes, III,** has been named Counsel for the department.

The R. H. Sheppard Co.—**Spencer A. Ware** appointed General Sales Manager.

Fruehauf Trailer Co.—**Roy W. Jacobs** appointed to the Board of Directors. He is also Secretary and Asst. Treasurer.

The Dow Chemical Co.—**Edwin A. Myers** appointed Research and Development Engineer, Mechanicl Development and Engineering Dept.

The Trailmobile Co.—**R. C. Taylor, Jr.,** elected as Vice-President in charge of Sales.

Automatic Steel Products, Inc.—**Arthur M. Wickwire** elected President.

United States Rubber Co.—**Harry W. Brown** appointed Sales Manager of the Automotive Dept.

Shakeproof Inc.—**Eugene W. Fuller** has been elected Vice-President. He is in charge of manufacturing and sales activities of the division.

Young Radiator Co.—**Walter G. Schlichting** appointed Sales Manager of Heating, Cooling & Air Conditioning Div.

Van Auken Co.—**George A. Robertson,** appointed General Sales and Advertising Mgr.

Kensico Tube Co.—**Thomas Nast,** elected President and Treasurer.

General Detroit Corp.—**Preston W.**

(*Turn to page 64, please*)

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Lamb Electric **MOTORS**

Compactly designed motor developed for metering pump and special instrument service.

● Lamb Electric Motors are *specially designed* for a specific application and therefore provide the exact electrical and mechanical characteristics for each product they drive.

In addition to this important advantage, other basic factors that contribute to the superior performance of Lamb Electric Motors are thorough engineering, exacting manufacture and rigid testing.

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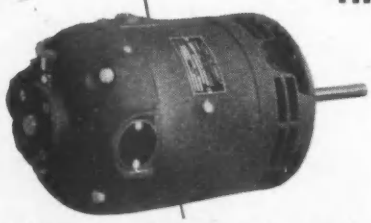
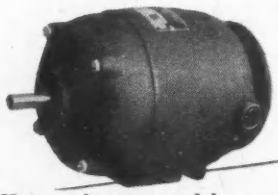


This motor is used extensively on such products as: industrial cleaners, agitators, sirens and colloid mills.



Universal motor used for commercial vacuum cleaners, wheel balancers, air compressors, etc.

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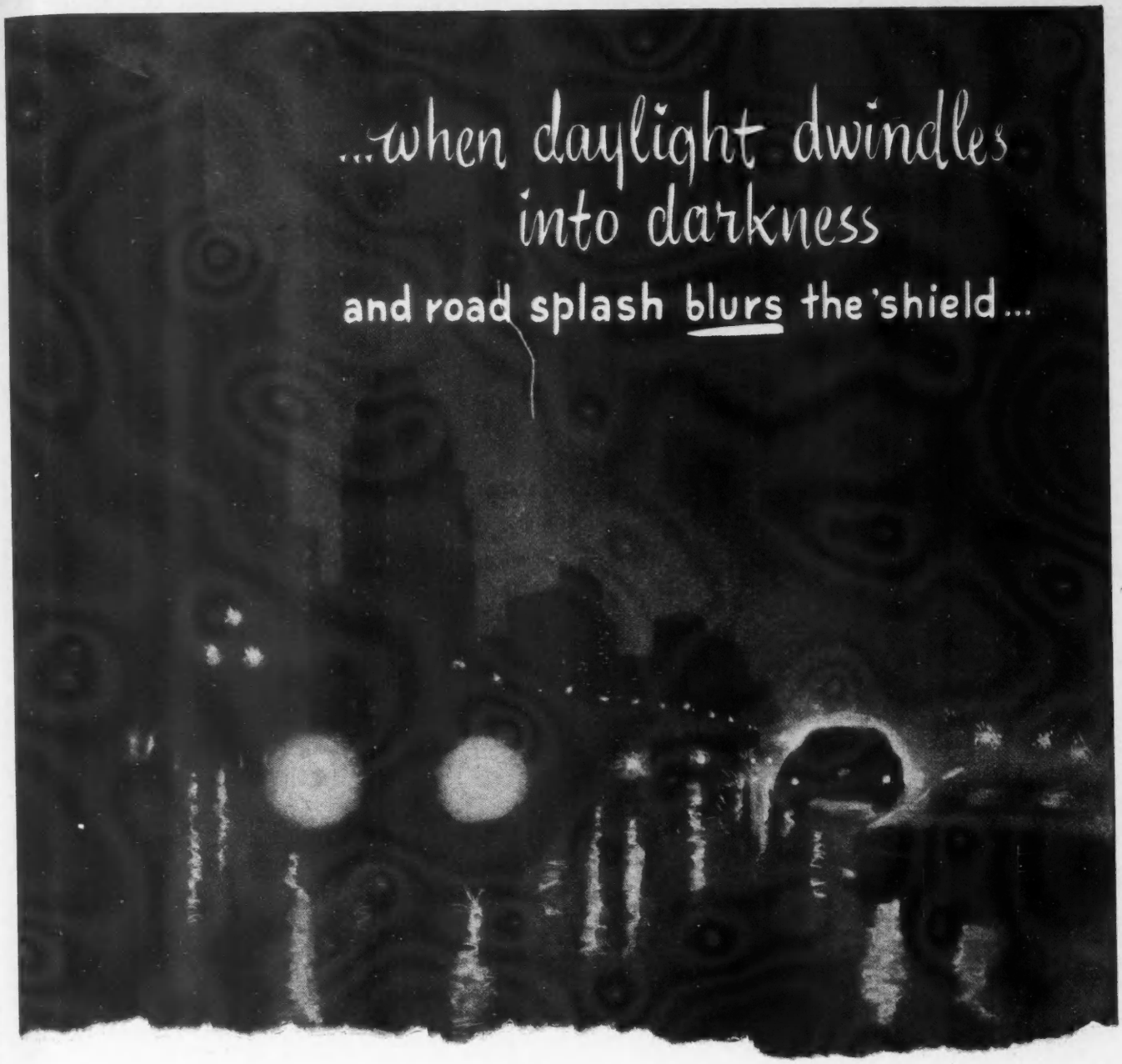

Vacuum-operated, the Trico Windshield Washer imposes no drain on the battery and can be used freely to wash off road mist, dust, grime and mud splash.

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In making factory installations, Buick, Cadillac, Oldsmobile, Pontiac and Lincoln are gratifying public demand for the famous "Two Little Squirts." And other important makes are piping new production for easy dealer installation. Low initial cost and costless operation encourage universal use of this important safety aid. Trico Products Corp., Buffalo, New York.

TRICO *Windshield Washers*

Nothing to Pump · Vacuum Operated

Personals

(*Continued from page* 62)

Wolf, Executive Asst. to the Vice-President. **H. J. O'Neill** has been appointed Field Sales Manager.

The General Tire & Rubber Co.—**Robert Moran** appointed Manager of Industrial Tire Sales.

Norma-Hoffmann Bearings Corp.—**Frank J. O'Brien,** President and Director of Metal & Thermit Corp., has been elected a Director.

Detroit Broach Co.—**George Squibb** has been appointed to the position of Chief Engineer, replacing **Leon Caplen,** resigned.

Russell Carburetor Co.—**A. C. Russell,** President and founder has announced his retirement. He is succeeded by **C. M. Crawford, Jr. J. J. Brophy** is Vice-President and Treasurer. Messr. Crawford and Brophy have been elected members of the Board of Directors.

E. W. Bliss Co.—**M. J. Herbs** has been made Asst. Export Manager.

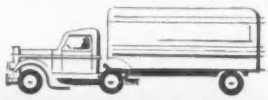
Thermoid Co. — **Carl Brockway** elected to a Vice-Presidency. Mr. Brockway will be responsible for all production of brake lining, clutch facings and other friction materials.

Avco Manufacturing Corp.—**Raymond C. Cosgrove** and **Carl H. Kindl,** Vice-Presidents, have been elected Executive Vice-Presidents.

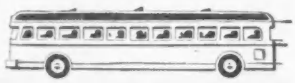
Continental Motors—**Albert VandenBerg** has been appointed Service Manager of the Airplane Engine Div.

If you manufacture...

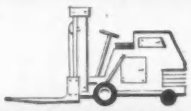
Automobiles



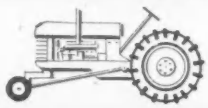
Trucks and Trailers



Busses and Trackless Trolleys



Industrial Electric Trucks



Tractors

Aircraft

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Through intensive specialization in wiring harness assemblies, Essex has developed line production methods of manufacturing, assembly and inspection, for the economical production of high grade, individually tested, specially engineered assemblies.

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Trends in Farm Tractors

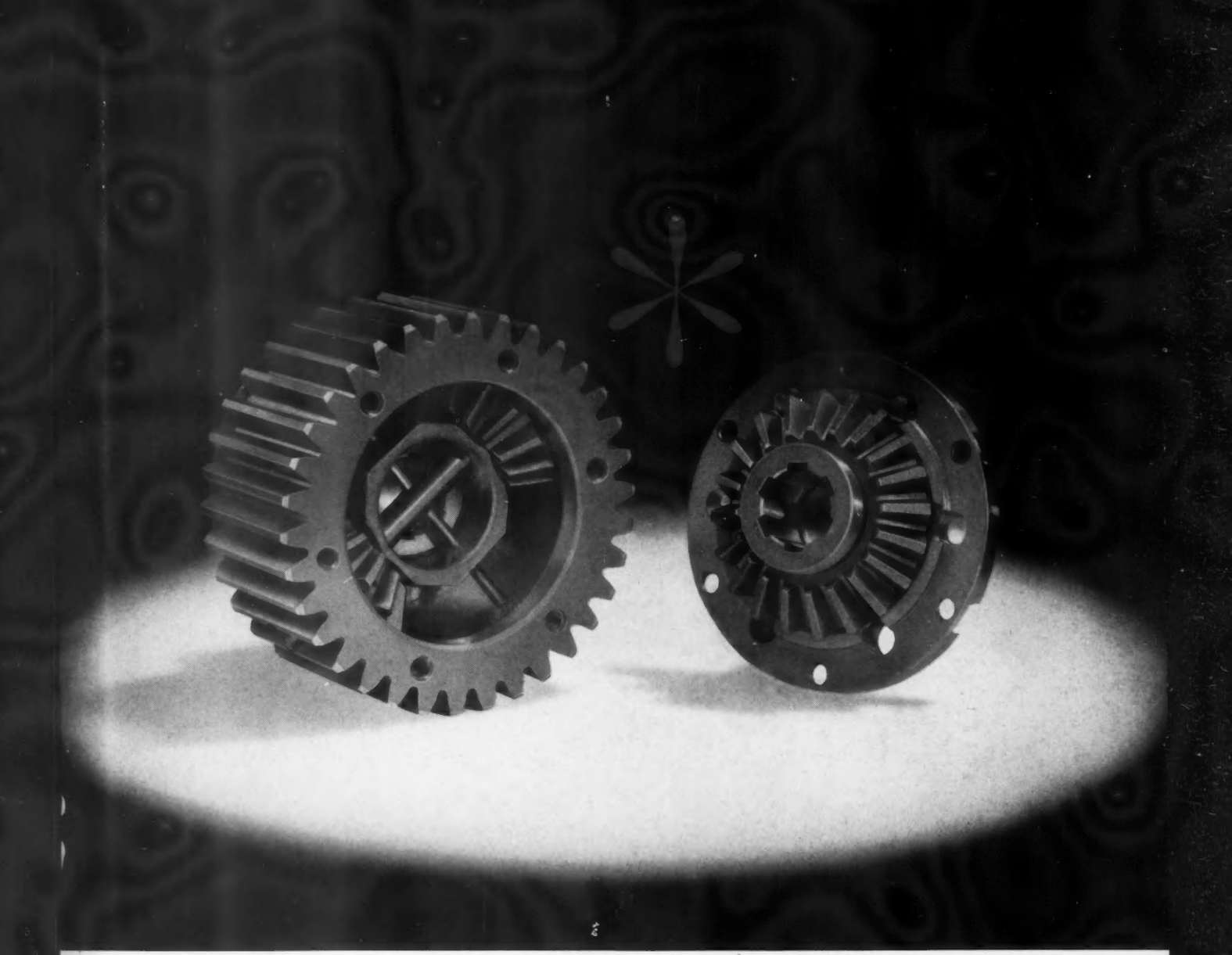
(*Continued from page* 34)

will pull his load properly and conveniently, without excessively overloading the engine or having to shift gears too frequently. Shifting frequently while the tractor is moving has created a need for a synchromesh transmission. This type of transmission has been used experimentally but, because of its higher cost it has not been incorporated; consequently, the clash gear type prevails and there are many instances where the tractor is operated in a lower speed gear than necessary simply to avoid stopping to shift gears.

Fluid couplings tend to reduce the frequency of gear shifting when the operator tries to use the highest speed possible but they have an inherent power loss. With their use, the coupling loss is probably balanced by the gain in engine efficiency since the engine can now be operated at a higher load factor for a greater percentage of the time.

In an effort to approach the condition of an infinite speed selection transmission, some companies are presently experimenting with a hydraulic torque converter and transmission. With this device, they hope to eliminate half of the selective gear speeds and still accomplish more work in less time because the hydraulic converter can adjust to variation in load and thus, perhaps, eliminate the necessity of shifting gears. The case for the converter has yet to be proven, since the gain in time to get the work done is paid for by a greater fixed cost in the tractor plus a somewhat higher fuel consumption. It seems that a planetary transmission in conjunction with a hydraulic torque converter may be the ideal combination for the future.

The foregoing was abstracted from a paper delivered by Mr. Overholt before a recent meeting of the Chicago Section of the SAE.



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But it's unique in another way as well. You'll admit that this gear application is non-conventional. Yet its manufacture, thanks to Double Diamond methods, has been reduced to simple production techniques. As a consequence, these assemblies flow through the plant as smoothly—as predictably—as the more conventional gears required by many other customers. By keeping ourselves "geared" to do the unusual we apply our experience and facilities to the manufacture of exceptionally fine gears built to the precise requirements dictated by your needs.

Whether your gear problem is simple or complex, bring it to Automotive Gear. If you have engineered it, well and good. If you haven't, our engineering staff may be able to help you. In any case you will get gears that are as good as we know how to build them.

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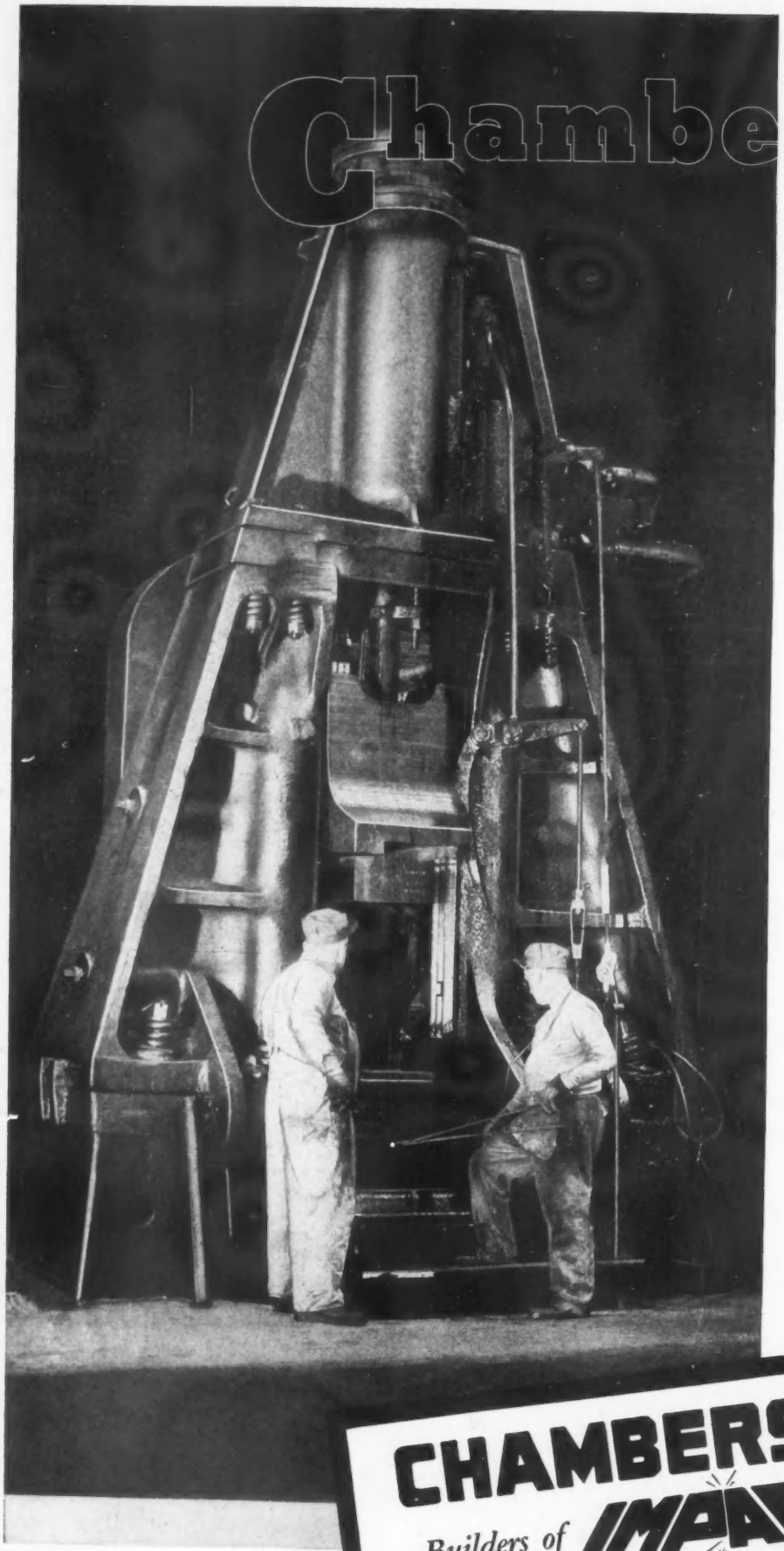

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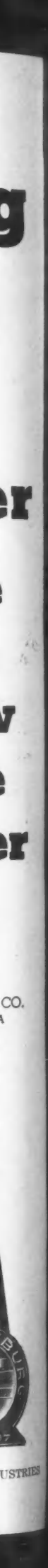

Bath Contour Forming

(*Continued from page* 33)

jaws is atached to the head of the hydraulically operated ram and is free to swivel on its base. The other end of the work is held in a jaw mounted on the rotating table which carries the form or forms for shaping the work. After the work has been firmly gripped in the jaws the hydraulic ram is set to maintain an initial pressure—determined by experience—to produce the desired tension or stretch while the metal is worked by the die. For certain shapes it is found advisable to vary the pressure at different positions and this can be done automatically. In other cases the shape of the die itself takes care of the required variation in tension. For example, the sharper radii impose more stretch on the outer fibers than on the smaller radii. The table of the machine is set to stop automatically at the desired end position, the jaws are released, and the work is then complete.

In sheet contouring one of the principal advantages of the rotary method is that shapes can be produced up to curvatures of 250 deg. whereas conventional methods are said to be limited to less than 180 deg. When forming flanged sheets, curvature is limited to a large extent by the amount of stretch which the main body of the sheet can tolerate in producing inner radii free from wrinkles.

The process has unusual advantages in stretch forming materials such as stainless-clad steel where the surface may be readily marred or scratched in conventional dies. Some materials can be formed in the annealed condition and then heat treated to develop the necesary physical properties. On the other hand, when handling aluminum alloys, slight corrections in design make possible the use of the harder alloys in the ST condition. So long as the alloy has sufficient elasticity to meet the requirements of stretch forming, it is strengthened by cold working.

In handling complex cross-sections a certain amount of compression may take place due to shifts in the neutral axis of the section while under tension. Under these conditions it is feasible to use a reverse process whereby the metal is pushed by means of heavy rolls or shoes onto the form to permit the outer fibers to elongate while the inner fibers are compressed. All of these conditions can be anticipated if a careful study of the initial design is made.

One of the sources of real economy in making large parts such as bumpers and rub rails by this method is that the parts can be made from sized blanks without any allowance for trim and scrap. This is particularly important when handling expensive materials such as stainless-clad or stainless steels.

Picture of Progress

These white-finish kitchen cabinet assemblies are Duridized for long paint life and over-all product protection.
Photograph courtesy of Tracy Manufacturing Company

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It cleans and phosphate-coats.
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(*Continued from page* 26)

is likely, but not at the present session. A senate Commerce Subcommittee opened hearings early this month on a proposal to study the effects of the decisions in the Cement Institute and Morton Salt cases. This of this article.

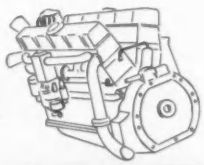
Sen. Capehart, R., Ind., chairman of the subcommittee, is also sponsor of the Senate resolution, S. Res. 241, appropriating $15,000 for a formal investigation of the effects on industry of these decisions. However, any idea that Congress will legalize any delivered price system, basing point, zone, or any other such method, should be dispelled for the immediate future. The steel industry's warmest friends in Washington, fully sympathetic to the industry's pleas for action, cannot foresee such a development, regardless of the political complexion of Congress.

Therefore, Congress is being urged to attack the problem from an oblique angle. A possible result would be legislation which would apply the "rule of reason" to all Commission proceedings. One effect of such legislation would require the Commission to prove that trade practices in question are unfair to the consumer and against the public interest, in addition to a pure mechanistic interpretation of the law.

Such measure as H.R. 3871, now before the House Interstate and Foreign Commerce Committee, which would strip the FTC of its judicial functions are not likely to get through Congress in an election year. However, important background for eventual legislative action is being laid and interests who feel that they have been or will be hurt by recent decisions are being given an opportunity to put their views in the record.

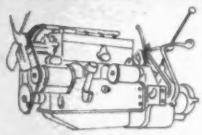
Finally, these decisions undoubtedly will stimulate more serious consideration of legislation to permit industry to police itself by means of an expanded trade practice conference program, under FTC supervision.

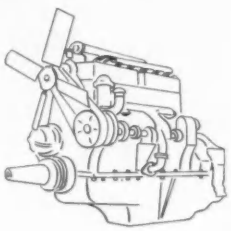
There's a Proved-In-Service

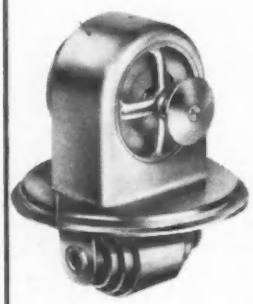


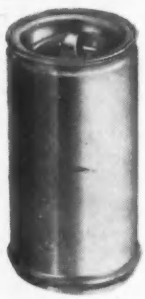
DOLE THERMOSTAT

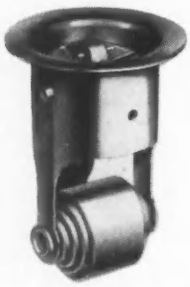
For Every Cooling System











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The Benefits of Bigness

(*Continued from page* 25)

the same is true for other consumer durable goods, with hundreds of widely scattered plants contributing parts or complete units to the total output. By their results they must be judged successful.

All of those operations were started and they grew, many of them spectacularly, in a period when steel products generally were sold on the basing point method of pricing. The men who had the vision to venture into those new fields knew where and how their materials could be bought. These factors presented no obstacles even to embryo industries. If their results are a fair measure of industrial growth under that condition, then the country would be lucky to have more of it.

If steel products were required to be sold at f.o.b. mill prices, with the same mill net on all like sales, delivery costs would set a market limit for each mill; widely scattered buyers of steel products would be penalized in direct proportion to their distance from a producing point; and local monopolies would be created by elimination of competition from a zone around each mill. Apparently the only way to prevent such disrupting effects will be by legislation, to clarify the status of pricing methods.

Without such legislation general application of the Cement case decision may destroy the balance of competitive forces which has evolved through several decades of close and satisfac-

(*Turn to page* 70, *please*)

New boring and turning machines TO BROADEN YOUR PROFIT MARGIN

Model 36

On one of the parts illustrated the bore is limited to a .0005 taper. Many bores have a .001 total limit. On one job the production rate is 1,080 pieces per hour; on another, production was increased from 180 to more than 300. Specifications for the valve stem call for a .0001 limit on size from one end to the other, .0002 for concentricity, and .0006 limit from piece to piece.

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An unlimited variety of set-ups can easily be arranged. In addition to straight boring and turning, facing and chamfering, it will accurately follow contours cut on its cams, and will produce lands, recesses, flanges, steps, counterbores, and radii . . . all with a single point tool. Only one dimension cut by this tool requires inspection.

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NEW BRITAIN, CONNECTICUT

FTC Now Studying Quantity Discounts

(*Continued from page* 26)

statutory ban because they are based upon a general quantity discount schedule open to all purchasers, but of which only large purchasers are in a position to take advantage. After noting that only five large chain stores have ever bought sufficient quantities of salt to qualify for one of the quantity discount brackets, the Court said:

"Theoretically, these discounts are equally available to all, but functionally they are not. . . . The legislative history of the Robinson-Patman Act makes it abundantly clear that Congress considered it to be an evil that a large huyer could secure a competitive advantage over a small buyer solely because of the large buyer's quantity purchasing ability. The Robinson-Patman Act was passed to deprive a large buyer of such advantages except to the extent that a lower price could be justified by reason of a seller's diminished costs due to quantity manufacture, delivery or sale or by reason of the seller's good faith effort to meet a competitor's equally low price."

The Benefits of Bigness

(*Continued from page* 68)

tory commercial relationships, between producers and users, between manufacturing plants and their markets.

This is not the place to try to appraise all the ultimate effects of the strange concept of price which seems to be inherent in that decision. But it is hard to figure how any effects which are bound to be harmful to this industry and to the users of its products can be helpful to the general economic welfare of the country.—From address by Mr. Tower at recent AISI meeting in New York City.

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SPUR. Straight, helical, and internal. Sizes from 16 pitch, 1½" dia. (approx.), to 1½ pitch, 36" dia. (approx.).

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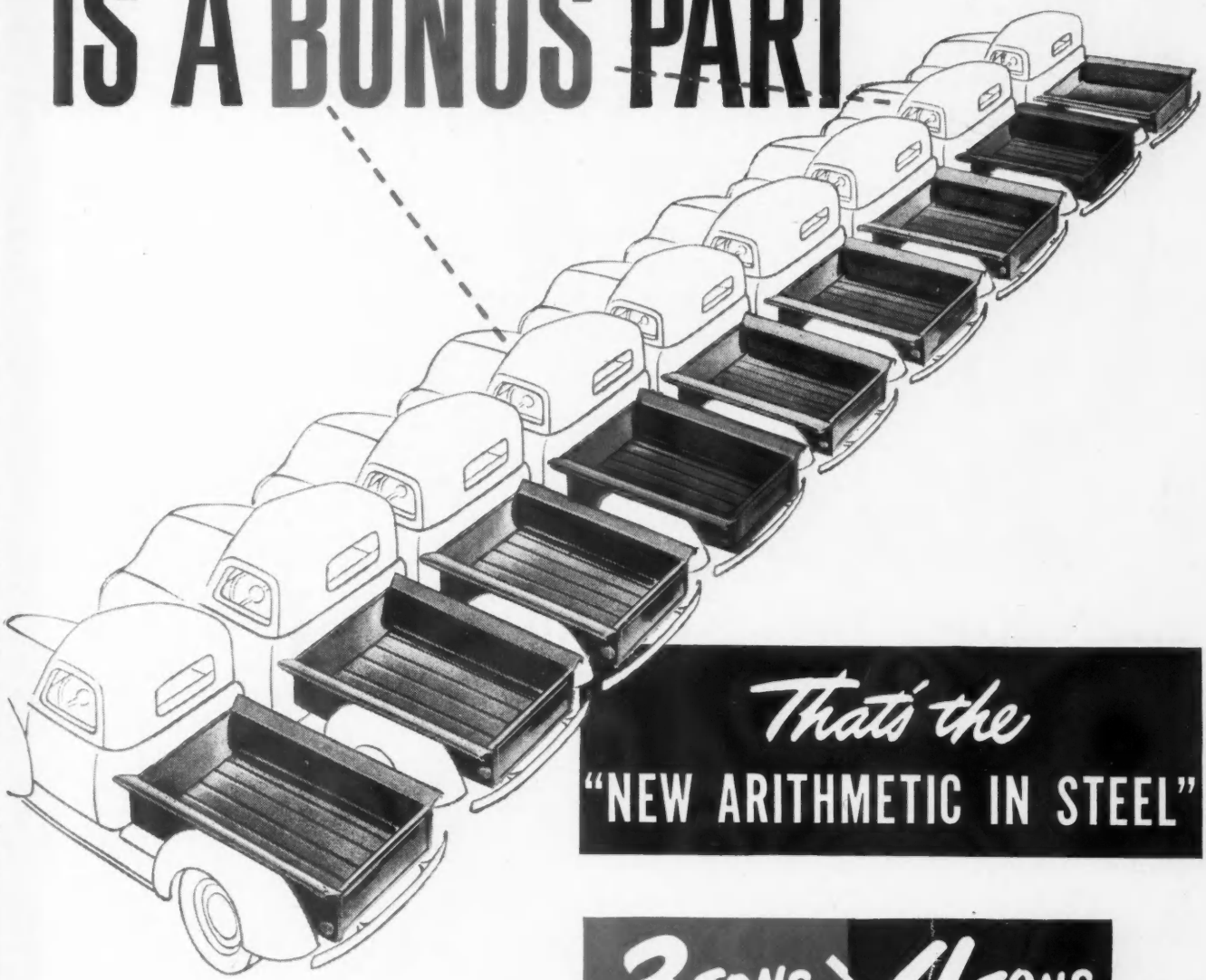

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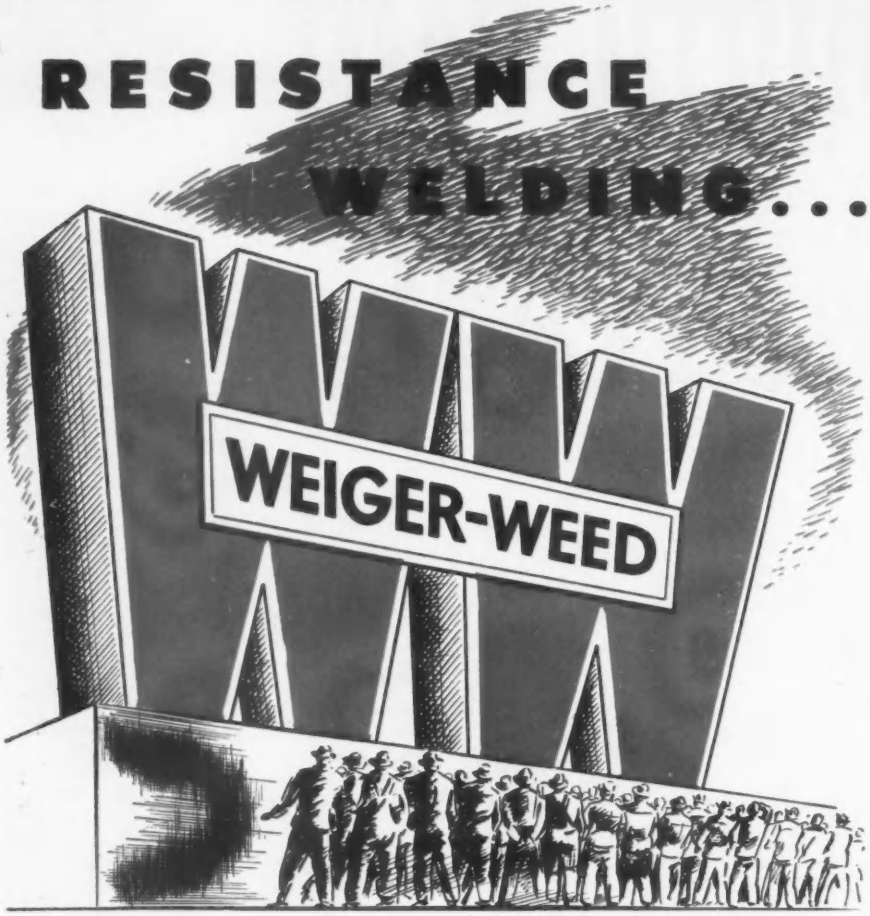

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Since early 1946, users of resistance welding have come to recognize Weiger-Weed as the progressive company, the company that grows with the industry, that keeps to the front with time-saving and cost-saving developments.

The personnel of Weiger-Weed, both at the plant and in the field, is made up of men who pioneered in the development, application and manufacture of copper base alloys for resistance welding. The knowledge and experience of these men is backed by the resources, facilities and metallurgical experience of the Fansteel research staff, all working together to serve you.

Weiger-Weed places at your service its special engineering and production skills to help your production engineers to obtain more and better welds at lower cost. Write for recommendations on your problems. Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Ave., Detroit 4, Mich.

Weiger-Weed produces high quality spot welding tips, holders, seam welding wheels, and special dies for flash, butt and projection welding. Deliveries are prompt; standard electrodes and holders supplied from stock.

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BOOKS...

BRITISH COMMERCIAL VEHICLE INDUSTRY, compiled by the staff of *The Commercial Motor* and published by Temple Press Ltd., London E. C. 1, England. 258 pages. Price: One guinea.

The contents of this book are mainly devoted to illustrated descriptions of all British commercial vehicles available for export. These are divided into five principal sections: Goods vehicles, Passenger vehicles, Municipal vehicles and appliances, Bodywork and Proprietary units. Within the five main sections are various sub-sections, all clearly identified to facilitate reference. For instance, the "Goods Vehicle" section is divided into chapters dealing separately with four-wheeled vehicles (internal combustion), rigid multi-wheelers (internal combustion), articulated multi-wheelers (internal combustion), electric vehicles and industrial trucks, three-wheeled vehicles and industrial trucks (internal combustion), road haulage tractors, land tractors, and trailers and semi-trailers.

Passenger vehicles with internal-combustion engines are similarly separated from trolley-buses, and municipal vehicles and appliances are handled under eight different classifications. In addition to the descriptive matter and illustrations, specification tables are included with the appropriate sections. Metric equivalents of British weights and measures are given.

There is a comprehensive proprietary-units section dealing with proprietary engines, major components of 25 different kinds, accessories and supplies under 124 headings, tires and workshop equipment under 78 headings.

A glossary of terms commonly used in the export business completes the 171 pages of editorial matter, which are supported by nearly 100 pages of advertisements. The book is printed on art paper and many of the pages are in full color.

The book is available for export only—post free to any address outside the United Kingdom.

Three aspects of the development of public and industrial relations policy—labor relations, planning and research for top management, and the methods of policy formulation—are discussed in a 52-page pamphlet, DEVELOPING PUBLIC AND INDUSTRIAL RELATIONS POLICY, published by the American Management Association.

Authors contributing to the volume include John A. Stephens, vice president in charge of industrial relations, United States Steel Corp. of Delaware, Pittsburgh, and AMA vice president in charge of the Personnel Division; Rodney Chase, director of public and industrial relations, Chase Brass and Copper Co., Waterbury, Conn.; Leroy H. Kurtz, department of public relations, General Motors Corp., New York; and H. W. Nourse, vice president, economic controls, United Air Lines, Inc.

Mr. Stephens analyses the necessity of solving the economic problems of major industries in terms of public welfare. Mr. Chase advances the proposition that management's public relations influence management's industrial relations but both are clouded by unawareness of fundamental economic facts and are confused by the semantics of languages used in labor-management discussions.

Mr. Kurtz contends that policy as the conscience of business must be open to a "free two-way flow of ideas and dynamic comprehension." He sets forth methods of determining policy used by General Motors. Mr. Nourse describes his company's consolidated organization for special research as a basis for top management decision.

This pamphlet, No. 140 AMA's General Management Series is now available from the American Management Association, 330 W. 42nd St., New York 18, N. Y., at $1.00 a copy.

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Luxurious heating comfort—combined with healthful cleanliness, automatic convenience and fuel-saving economy. Even the smaller and more modest American homes can enjoy all this today. Because America's makers of heating, ventilating and air conditioning equipment are always progressing. They use Reynolds Industrial Wire Cloth. And not alone because its quality is unquestioned. Reynolds engineers constantly co-operate in design improvements to better performance. Why don't *you* consult them?

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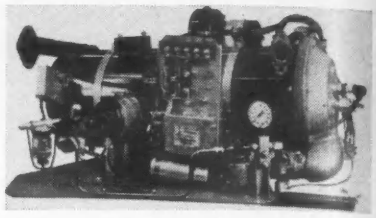
DIXON, ILLINOIS

Improved Booster Heater

Surface Combustion Corp., Toledo 1, Ohio, is now producing a new, improved model combustion type booster heater for use on motor coaches and transit buses which is said to be capable of supplying sufficient heat for warming coach interiors and for maintaining desired engine temperatures regardless of the weather. Easy starting of engines as well as reduced operating costs are also claimed for the new heater.

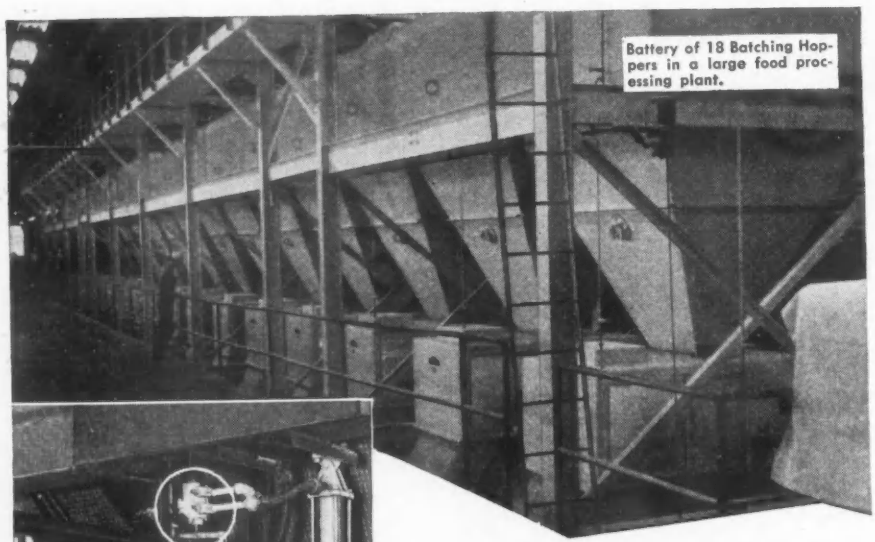
The SC heater furnishes its own heat independently of the engine, drawing its fuel from the same supply as for the engine. Its function is to supply additional heat to the cooling system of the engine, so that regardless of engine load and whether or not the engine is operating, the engine cooling water is maintained at desired temperature. The regular water-heated converters used in the coach are thus supplied with water at sufficient temperature to assure adequate interior heating. The engine's cooling system may also be supplied automatically with heat even while the coach is left standing overnight.



Booster heater made by Surface Combustion Corp.

The capacity of the improved heater is such that it can supply up to 75,000 Btu per hour in addition to the heat derived from the cooling system of the engine. Although this high heat output is available from the heater, the full capacity is ordinarily required only for short periods of time. Fuel consumption ranges up to 3/4 gallon per hour of either Diesel fuel or gasoline, whichever is used by the engine.

The engine cooling water is circulated through the heater, either by the engine water pump or by an electrically-driven auxiliary water circulating pump, or both, depending upon the desired installation. The auxiliary pump is obviously necessary if heat is to be supplied when the engine is not operating.


Battery of 18 Batching Hoppers in a large food processing plant.
NOPAK Reciprotrol Valve and Model E Cylinder, on each hopper, operate shakedown mechanism automatically.

AUTOMATIC "SHAKE-DOWN" for 18 Batching Hoppers is NOPAK Operated . . .

This block-long battery of hoppers is used for measured mixing of product ingredients. Running thru each hopper is a rotating shaft, with paddles, connected to a NOPAK Model E Hydraulic Cylinder. As the cylinder reciprocates, the paddles shake down the dry ingredients which drop into glass-enclosed weighing batchers. Each of the 18 cylinders reciprocates 20 times per minute, 18 hours a day. This continuous reciprocating action is governed by 18 NOPAK Reciprotrol Valves. The entire mixing process is fully automatic . . . controlled from a central switchboard by 2 operators.

NOPAK Reciprotrol Valves can help you achieve automatic control of cylinder action in your plant, or in your product. Write for Illustrated Bulletin.

GALLAND-HENNING MFG. CO., 2774 S. 31st Street, Milwaukee 7, Wis.

Representatives in Principal Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

A 5410-½I

U-Flex Piston Ring

(*Continued from page* 39)

This is greatly facilitated by means of the familiar Sturgis wet tumbling barrel technique, using selected granite stone mixed with a soap. After that the rings are given the familiar Parko-Lubrite treatment to afford the proper surface coating for good engine break-in.

Before shipment the rings are put through an extensive inspection procedure designed to check them visually and dimensionally, including correct O.D. The latter inspection is handled in a specially designed gage into which the ring is compressed while maintaining a standard gap by means of an insert.

Wright's New Facilities

(*Continued from page* 44)

prime movers. The test control room is a center for control, coordination, and recording of operations in the burner and compressor rooms. Notable features of this room are several sets of manometers 15 ft in height, which may be electrically lowered into pits below the floor to permit engineering personnel to take readings at elelevel. More than one-quarter ton of mercury is required to fill these instruments.

Michigan WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tube

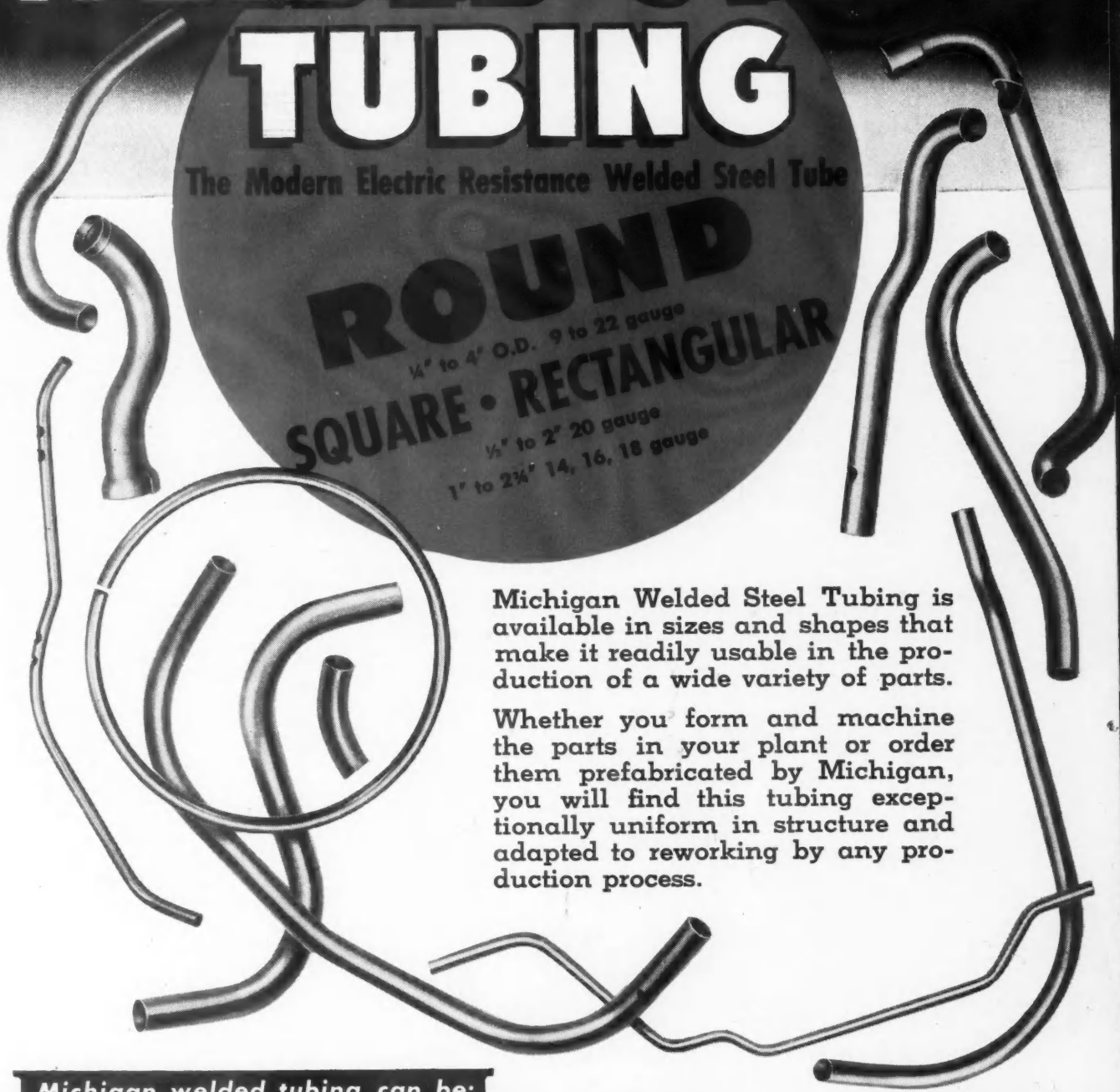
ROUND

¼" to 4" O.D. 9 to 22 gauge

SQUARE • RECTANGULAR

½" to 2" 20 gauge

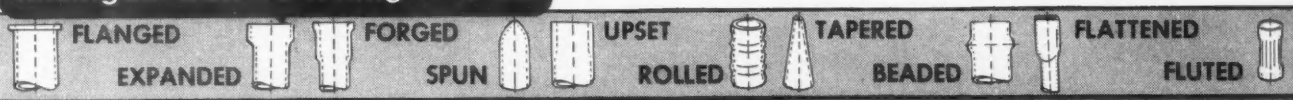
1" to 2¾" 14, 16, 18 gauge



Michigan Welded Steel Tubing is available in sizes and shapes that make it readily usable in the production of a wide variety of parts.

Whether you form and machine the parts in your plant or order them prefabricated by Michigan, you will find this tubing exceptionally uniform in structure and adapted to reworking by any production process.

Michigan welded tubing can be:



Engineering advice and technical help in the selection of tubing best suited to your needs. Address inquiries to:

Michigan STEEL TUBE PRODUCTS CO.

More Than 30 Years in the Business

9450 BUFFALO STREET • DETROIT 12, MICHIGAN

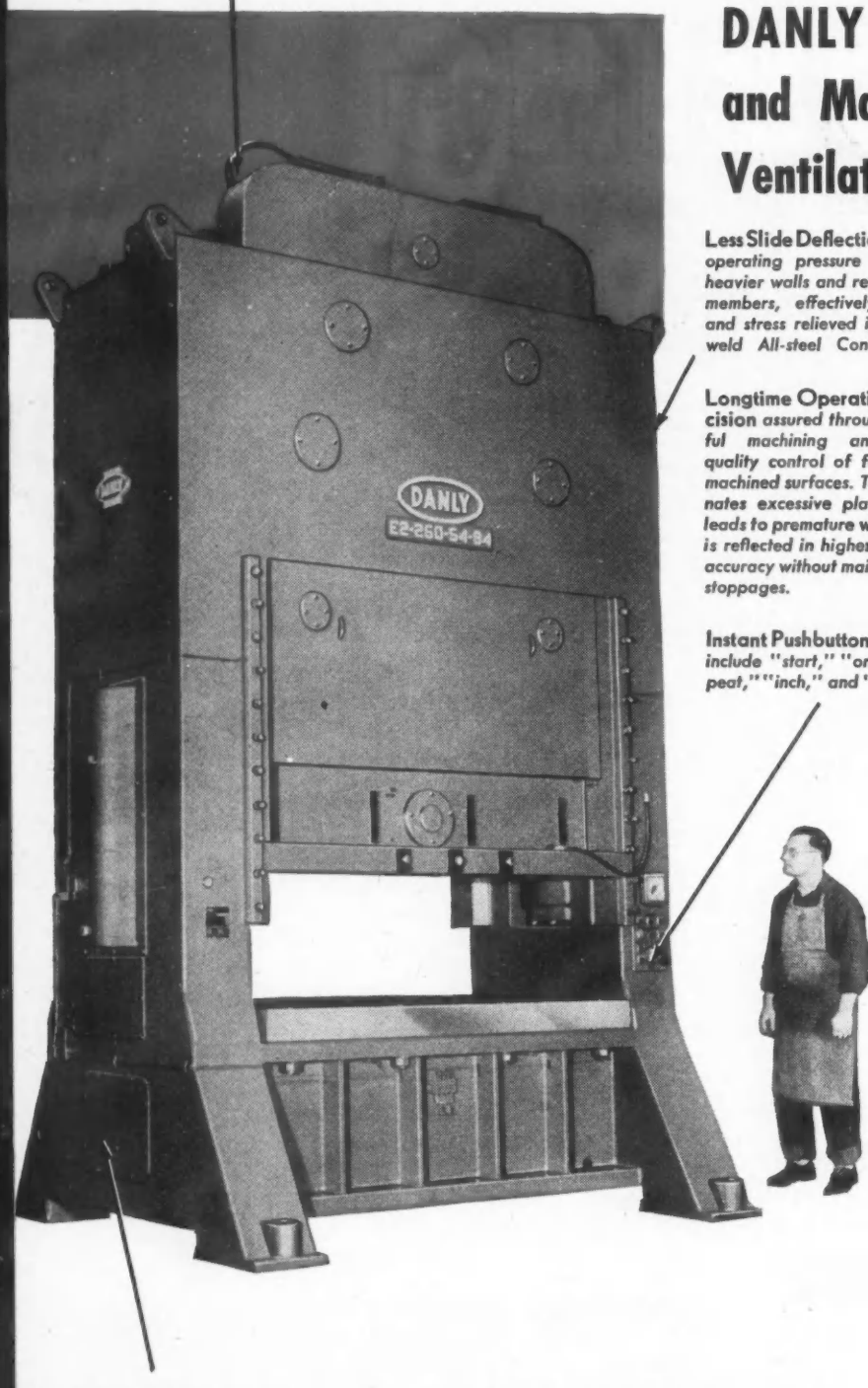
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillsdale, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Drummond, McCall & Co., Ltd., Toronto, Canada.

8,000,000

DANLY PRESSES Cut Production and Maintenance Costs with New Ventilated DANLY CLUTCH

Danly Clutch *designed for repetitive engagements under severe operating conditions of power press work. Long service life of this vital press mechanism offers major reduction in maintenance. (See detail on page opposite.)*



Less Slide Deflection *under operating pressure due to heavier walls and reinforcing members, effectively joined and stress relieved in Danly-weld All-steel Construction.*

Longtime Operating Precision *assured through careful machining and rigid quality control of functional machined surfaces. This eliminates excessive play, which leads to premature wear, and is reflected in higher product accuracy without maintenance stoppages.*

Instant Pushbutton Controls *include "start," "once," "repeat," "inch," and "reverse."*

Continuous Pressure Lubrication *keeps press inoperable until working pressure is built up in circulating oil system. Each gear, bearing and driving member in the crown and slide is continuously bathed in clean filtered oil.*

Faster Setups *are permitted by a reversible pushbutton control which withdraws punch from die at any point in the stroke. This also adds safety to trial strokes when trying out new dies.*

Down-time because of clutch maintenance, a major factor in controlling production costs in power press operations, is greatly reduced with Danly Presses equipped with the new ventilated air friction clutch. The new clutch, illustrated at right, is one of the reasons why Danly Presses give longer service with little maintenance attention.

A continuous engagement test recently completed is proof of the superior performance of the Danly Clutch. After more than 8 million engagements, run night and day for a period of 1½ years under simulated press conditions, the disc faces of the Danly Clutch measured less than one-thousandth of an inch of wear per 100,000 clutch engagements. Other components similarly indicated unusual endurance. Air-cooled, low-starting torque, and complete automatic pressure lubrication are vital features which now offer new possibilities for press applications for the production of parts.

These new developments are characteristics of Danly progress in press engineering.

engineering service

For assistance in determining the most efficient press for your own type of stampings, call on Danly engineers. Send details about your problems.

Without obligation, you will receive specific recommendations how production costs can be reduced.

DANLY PRESS CONSTRUCTION:

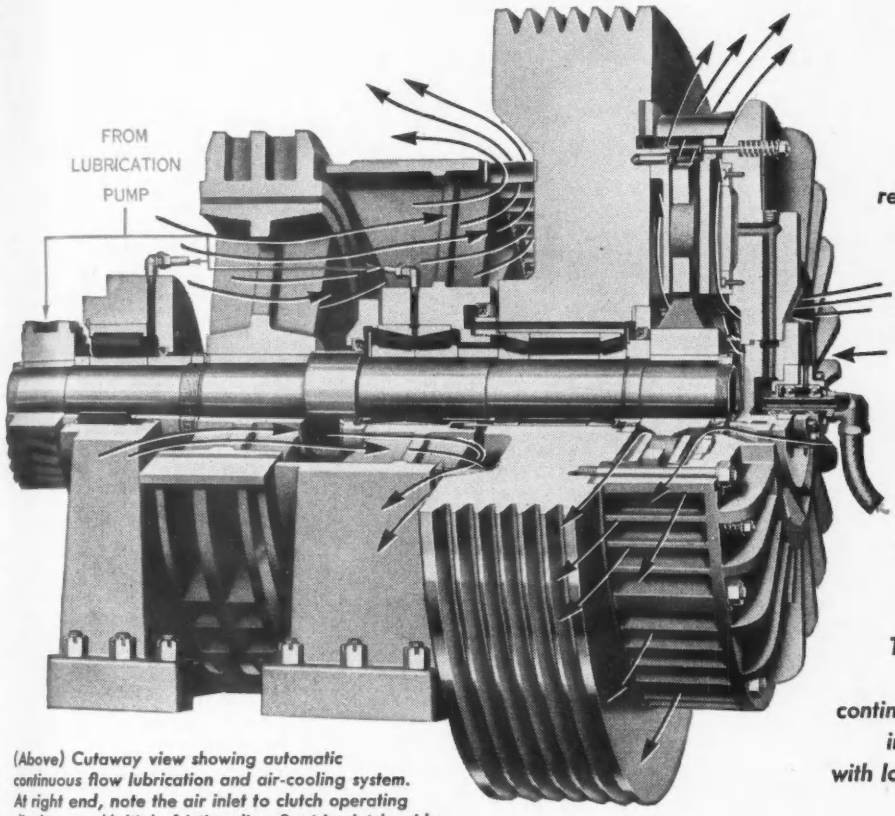
Faster Setups . . . Less Maintenance

. . . More Production

DANLY

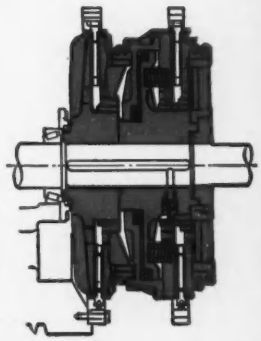
PRECISION DIE SETS...STANDARD AND SPECIAL

PRESS CLUTCH ENGAGEMENTS
. *under load* with negligible wear



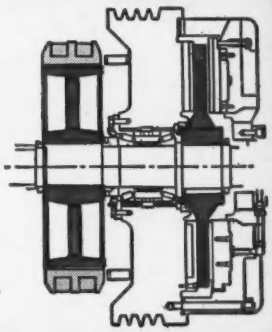
(Above) Cutaway view showing automatic continuous flow lubrication and air-cooling system. At right end, note the air inlet to clutch operating diaphragm. Multiple friction discs float in clutch spider when disengaged. Brake shoes in drum at left are spring-engaged and air-released automatically.

Cross sectional outline of conventional clutch shows relative proportion of components subject to acceleration (indicated in red).



conventional type press clutch

Note the smaller mass of accelerated components in the Danly Clutch. The larger mass (not shown in color) in continuous rotation results in easier acceleration with lower starting torque.



new Ventilated Danly Clutch

Danly Press and Clutch Features Reduce Press Down-Time

Construction features of the Danly Clutch offer specific reasons why Danly Presses cost less to operate and produce more stampings over a given period.

★ **Long Life of Friction Discs** is assured because of the low starting torque of Danly Clutches. Low-energy clutching characteristics have been achieved by a new design which requires less than one-fifth the mass in clutch components subject to acceleration, as compared to conventional press clutches.

★ **Cool Operation** further reduces wear of friction discs and provides protection of the antifriction bearings from overheating. The clutch housing itself is a cooling fan which provides high velocity ventilation through internal ports adjacent to areas where heat is generated.

★ **Automatic Pressure Lubrication** circulates clean, filtered oil to each bearing *including the flywheel bearings.* There are no grease fittings requiring periodic attention of the operator.

★ **Instant Pushbutton Activation** is produced by compressed air controlled by an electric solenoid valve.

★ **Simple Disassembly** permits inspection of parts subject to wear. This can be done in only a few minutes. It is unnecessary to dismantle entire clutch to make infrequent replacements of worn parts.

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

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Write TODAY for valuable literature illustrating and explaining features of and suggesting profitable uses for Danly Presses. Standard Press Models available from 50 to 1,500 tons.

New Stabilizer for Double-Deckers

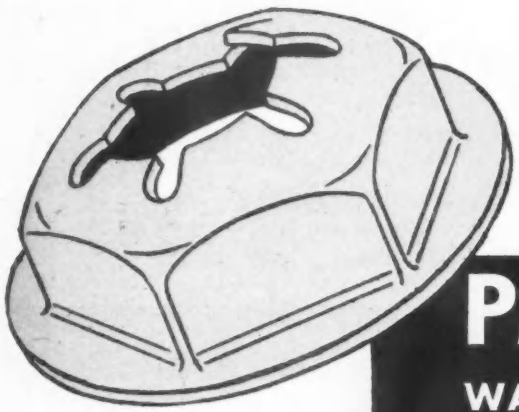
(*Continued from page* 31)

that it would have been possible to make the device so rigid that it would hold the back axle parallel to the latitudinal line of the chassis at all times; in such a case, every transverse oscillation of the axle would have been transmitted to the body. Some resilience in any anti-roll device is therefore essential; in this case the resilience comes from two sources:—(1) The distortion of the tube, and (2) The deflection of the rubber bushes in each mounting bracket.

This resilience, though small at its point of origin, is, of course, multiplied at the road wheels, and its two contributory factors have been so adjusted as to afford the most desirable amount of resistance to sideways roll and sway. On the road, therefore, the practical effect will be found to be a more comfortable ride at a more consistent speed maintained on road curves; in some cases improved time-keeping may be noticed.

Quick, secure fastening at low cost

Handle ONE part **instead of THREE**



on
MOULDING STRIPS
HOOD and TRUNK
MEDALLIONS
TAIL and PARKING LIGHTS
ETC.

PALNUT
TRADEMARK
WASHER TYPE SELF-LOCKING NUTS

Millions used monthly by automotive manufacturers

These inexpensive one-piece, "Palnut" Self - locking Nuts perform the same function as regular nut, lockwasher and plain washer combined. You not only replace three parts with a single "Palnut", but power drivers may be used to further speed up assembly. Special sockets for power drivers pick up, spin on and tighten "Palnuts" in one operation. Once tightened, "Palnuts" stay tight under vibration—assured by their exclusive double locking spring action.

Send for samples. Ask for literature on entire "Palnut" fastening line.

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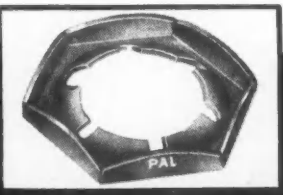
PALNUT TRADE MARK *Self-Locking* NUTS and FASTENERS



Gramm Aluminum Trailer Series

(*Continued from page* 49)

running gear are the same as for standard Gramm trailers. However, they have found it possible to dispense with the usual truss rods and truss jacks, and with the elimination of the latter have discarded the jack reinforcements. Important weight savings also have been made in the suspension system by eliminating the auxiliary springs and their mountings. Another important feature of interest is the adoption of the well known Dayton-Permold aluminum wheels.

Showing careful regard for the detail problem of safely joining aluminum parts to steel where the side panels are riveted to steel rub rails, the top and bottom rub rails are initially coated with a special asphaltic base paint containing aluminum flakes. This coating, said to effectively prevent corrosion, reduces the hazard of galvanic action, and produces a good aluminum finish at the same time.

Drake America Gets Control Of Hill Diesel

Drake America Corp. has acquired a controlling interest in the Hill Diesel Engine Corp. of Lansing, Mich. According to George L. Artamonoff, president of Drake, the new unit will continue production of diesel engines ranging from 10 to 60 hp, and in addition, the company will engineer and assemble high powered diesel units ranging from 35 to 200 hp to be marketed under the Drake trademark. The Hill concern was founded in 1898, and will produce the new diesel units especially designed for the export market.

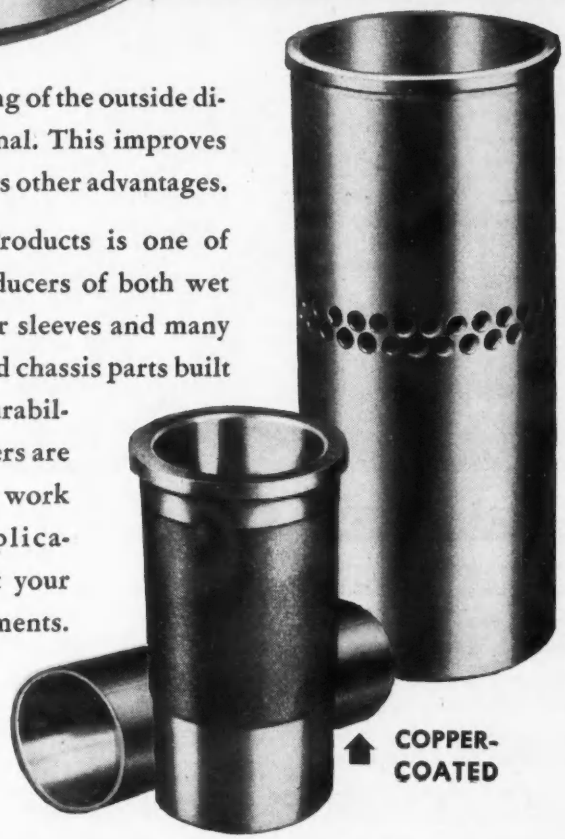
AUTOMOTIVE INDUSTRIES Readers are always well Informed

IT'S THE NEWEST Thompson cylinder sleeve, with over twice the Brinell hardness of ordinary sleeves, and hardened all-the-way-through.

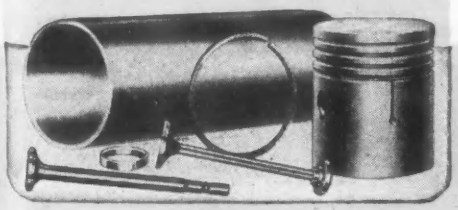
The Brinell hardness of this sleeve is 450-550 as compared with the 200-220 of ordinary sleeves. Its service life averages 2½ times longer than conventional sleeves or block bores. Life of pistons, rings and bearings is prolonged and oil consumption reduced.

Copper-coating of the outside diameter is optional. This improves heat flow and has other advantages.

Thompson Products is one of the largest producers of both wet and dry cylinder sleeves and many other engine and chassis parts built for extreme durability. Our engineers are always ready to work with you on applications to meet your special requirements.



Thompson improvements in precision parts engineering include Steel-Belted Pistons, U-Flex Oil Control Rings, Cylinder Sleeves, Valve Seat Inserts, Sodium-Cooled Valves, Valve Rotocaps.



Thompson Products

CLEVELAND • DETROIT • LOS ANGELES • ST. CATHARINES, ONTARIO

General News

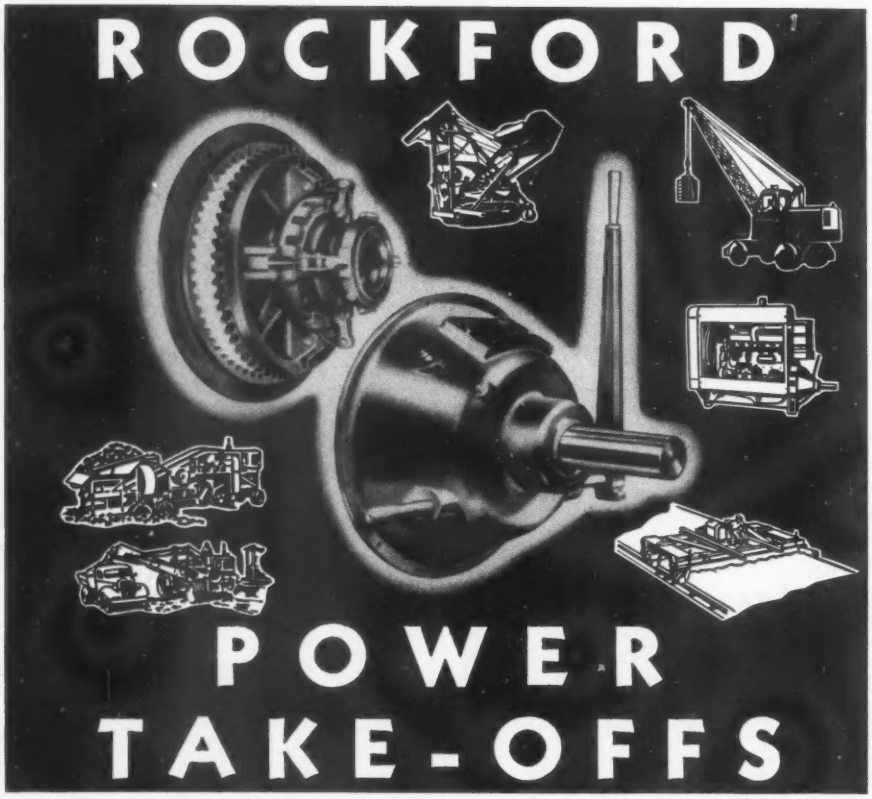
USCC Report Skeptical of Annual Wage Plans

The Chamber of Commerce of the United States remains skeptical of the guaranteed annual wage as a preventive of economic depression. In a recent report it urged employers to do everything possible to provide steady jobs for workers, but pointed out that many companies that tried guaranteed wage plans during the 1920's had to abandon them during the depression. The report adds that the approach to a guaranteed annual wage would have to be on something more broad in scope than an individual company basis, possibly on a whole industry, a series of industries, or on the entire economy and the government.

Dr. Asks Design Changes to Cut Front Seat Injuries

A Detroit plastic surgeon has some suggestions for automotive engineers for reducing the number of serious injuries to front seat passengers in automobile accidents. Dr. Claire L. Straith, chief of the Harper Hospital plastic surgery division, found that about 70 per cent of the serious injuries received in accidents were to persons riding beside the driver. He said that in one month while 83 drivers were hurt, 248 passengers in their cars were injured. As a partial remedy, he advocates the removal of all possible knobs, handles, cranks, and sharp edges from the interior of the car. In addition, he said, the windshield should be designed to swing outward under pressure to reduce injury caused when a front seat passenger's head is hurtled forward in a crash. He also recommended that dash boards be designed to cut down injury from the sudden impact of persons riding in the front seat.

ROCKFORD



POWER TAKE-OFFS

SELF CONTAINED UNIT
WIDE RANGE OF SIZES
CONSERVATIVE RATING
ROLLER BEARINGS
FINE ADJUSTMENT
ACCURATE BALANCE
S.A.E. DIMENSIONS

* ROCKFORD POWER TAKE-OFFS are designed for generous overload capacity, when the standard length shaft is used and the center of the load is placed at a point half way along the shaft extension. The proportions of the shaft and bearings are determined by the load capacity of the clutch selected.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.

NSPA Names George Stout as Advertising Counsel

The appointment of George W. Stout of George W. Stout, Inc. as advertising counsel to the automotive wholesaler division of National Standard Parts Association has been announced by J. L. Wiggins, NSPA executive vice-president.

23 New Car Firms Formed Since End of War

AMA reports in *Automobile Facts* that since the end of the war 23 new companies have announced plans for production of passenger cars. Most of the companies are planning to build very small automobiles to sell below $1000. In this particular category, seven companies are planning three-wheeled cars.

Neil Moore Resigns from Sealed Power

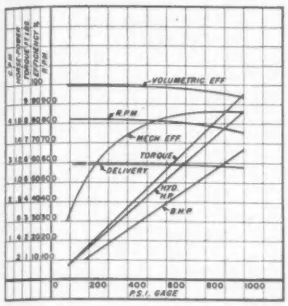
Neil A. Moore, general manager of Sealed Power Corp. of Muskegon, Mich. has resigned. He had been associated with Sealed Power for 20 years.

Goodrich Official Urges Cut in Tire Tax

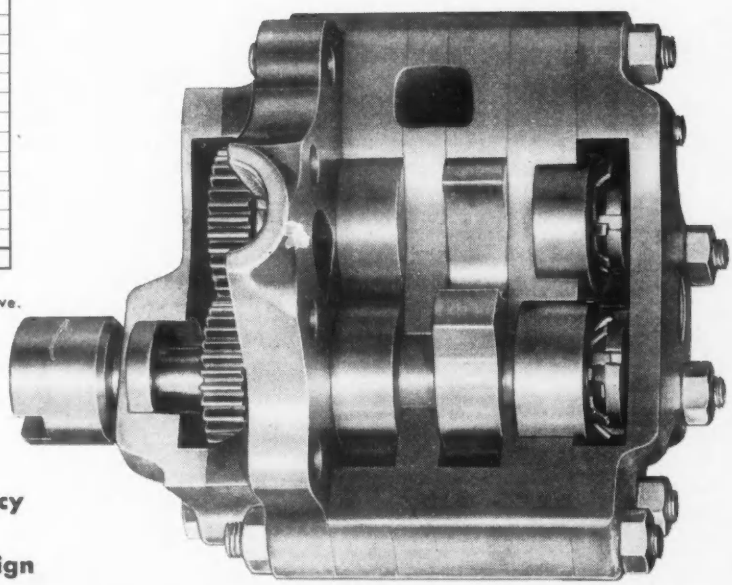
J. J. Newman, vice president of B. F. Goodrich Co., has urged that the excise tax on tires be reduced. He points out that the tax becomes greater with the adoption of the new low pressure tires since they weigh more than the former type. At five cents a pound, the tax on the 7.10 x 15 low pressure casing is $1.22, compared with $1.18 on the 6.00 x 16 tire. Mr. Newman said that the tax on the tires was first imposed during World War I when automobiles were considered a luxury, and was doubled during the last war. He pointed out that with tires shifted from the luxury class to a definite necessity, the excise tax should be reduced substantially.

Here It Is

360° OF SMOOTH...POSITIVE HYDRAULIC POWER

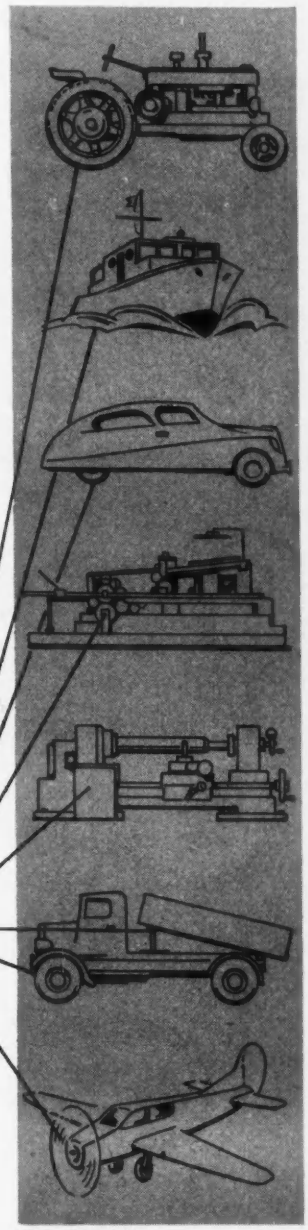


Typical low pressure performance curve.

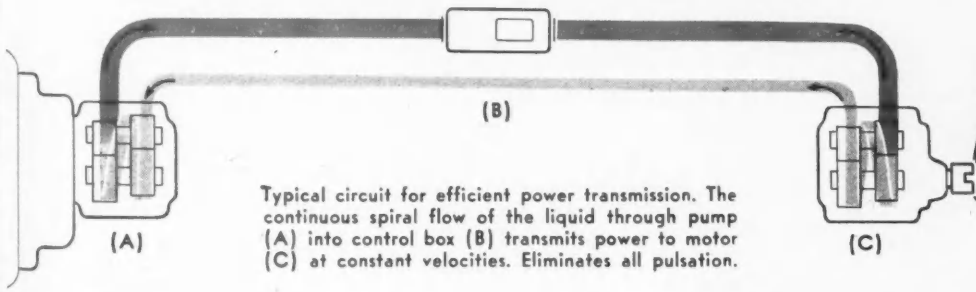


Patents Pending

Matchless Efficiency Through Revolutionary Design



GOES DIRECT TO THE POINT OF POWER APPLICATION



Typical circuit for efficient power transmission. The continuous spiral flow of the liquid through pump (A) into control box (B) transmits power to motor (C) at constant velocities. Eliminates all pulsation.

Berry Dual-Cycle Multi-staged Pumps, Motors, Power Converters give 360° continuous spiral flow of liquids . . . infinitely variable speeds . . . positive torque at all speeds without pulsation . . . high efficiencies . . . are completely reversible and are adaptable to any type of drive. They eliminate gears, shafts, transmissions, gadgets. Complete hydraulic balance on all moving parts eliminates need for bearing and parts replacements. Berry rotary hydraulic principle is superior for hydraulic speed reducers, automatic hydraulic clutches, variable speed transmissions, and many other uses. Simplicity of construction and high operating pressures result in low weight per H.P., long life, low cost. Fill out coupon for further information.

MAIL TODAY!

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Please send information on Hydraulic Pumps ☐
Motors ☐ Transmission ☐

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Company_____

Business Address_____

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BERRY MOTORS Inc.
ROTARY POWER
Matchless Efficiency Through Revolutionary Design
MAIN PLANT — CORINTH, MISSISSIPPI

Kester

dependability reduces soldering costs!

LABORATORY CONTROLLED

Watch the work flow when Kester Cored Solders are applied to your soldering operations. Kester Cored Solders are made to rigid specifications and can be depended upon to give uniform results every time.

There is a Kester "Specialized" Core Solder in strand size, type of flux, and alloy to fit your needs. Consult our Technical Service Department on any soldering problem.

KESTER SOLDER COMPANY
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KESTER SOLDER

Organized Labor's Monopolistic Powers

(*Continued from page* 27)

er by many labor leaders in recent years, the recklessness with which the entire public interest has been sacrificed, even in time of war, to advance the private interests of well organized minorities, have made it plain that the dominance of the general welfare must be reestablished by law. The law has given and the law must take away the special privileges and immunities by virtue of which labor unions have been practically licensed to violate the laws that punish all others who engage in comparable conspiracies to injure their fellow-citizens.

It is reasonable to hope and to demand that in the near future the leaders of organized labor will ally themselves with other faithful citizens in support of a government of law and order, under which men are free from all forms of public or private tyranny. Those who are unwilling to sustain such a government should openly acknowledge their preference for a dictatorship of the proletariat, and no longer pose as the champions of a democracy.—*Extracts from an address before the Third National Conference on Citizenship.*

CALENDAR

Conventions and Meetings

American Electroplater's Society Annual Convention, Atlantic City	June 28–July 1
Amer. Roadbuilders' Assoc. Road Show, Chicago	July 16–24
Nat'l. Auto. Acces. Assoc., Convention & Show, Chicago	Aug. 9–12
SAE West Coast Mtg., San Francisco	Aug. 18–20
Natl. Air Races, Cleveland	Sept. 4–6
SAE Tractor & Diesel Eng. Mtg., Milwaukee	Sept. 7–9
Soc. of British Aircraft Constructors Annual Air Show, Farnsborough	Sept. 7–12
Instrument Soc. of Amer., Natl. Instrument Conf. & Exhibition, Philadelphia	Sept. 13–17
Turin (Italy) Auto Show	Sept. 15–26
Nat'l. Assoc. of Foremen Convention & Silver Anniversary, Phila.	Sept. 23–25
Commercial Motor Transport Show, London	Oct. 1–9
SAE Aeronautic & Aircraft Eng. Display, Los Angeles	Oct. 6–9
Paris Auto Show	Oct. 7–12
Inst. of Traffic Engineers Annual Mtg., Phila.	Oct. 11–13
SAE Production Mtg., Cleveland	Oct. 21–22
Amer. Welding Soc. Annual Mtg., Phila.	Oct. 25–29
Amer. Soc. for Metals Nat'l. Metal Congress & Expo., Phila.	Oct. 25–29
London Passenger Car Show	Oct. 27–Nov. 6
Society of Motor Mfrs. International Motor Exhibition, London	Oct. 28–Nov. 6
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4–5
Automotive Service Industries Show, Navy Pier, Chicago	Dec. 6–10
SAE Annual Mtg., Detroit	Jan. 10–14
Natl. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24–27

Reduce Tubing and Pipe Costs!

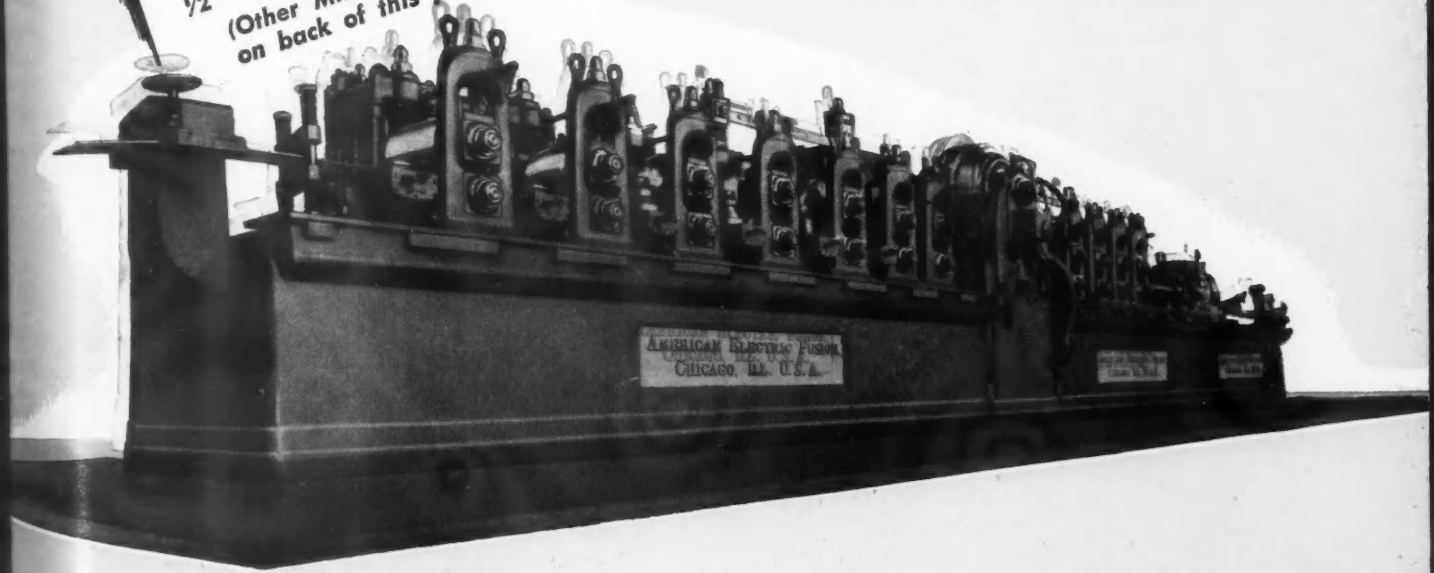
...roll your own with an A.E.F. TUBE MILL

A.E.F. MEDIUM WALL MILL illustrated produces:
WELDED MECHANICAL TUBING
(including Stainless)
UP TO 4" O.D.
(.156" maximum wall thickness)
and
WELDED AMERICAN STANDARD WEIGHT PIPE
½" to 2" from Strip Steel
(Other Mills described on back of this page)

If you use, or have an outlet for, 15,000 to 45,000 feet of tubing or pipe per day, depending on diameters, you can save enough money by producing it on an A.E.F. Tube Mill to pay for the mill in less than a year's operation!

Tubing or pipe is formed, electrically welded, scarfed, sized, straightened and cut to length in one continuous, automatic operation at speeds up to 65 feet per minute, depending on diameter and wall thickness. Here's high production at lowest possible cost. You can't buy tubing or pipe at prices to compete with rolling your own on an A.E.F. Mill.

Now is the time to look ahead to reduced costs. Find out how much you can save by installing an A.E.F. Tube Mill. Submit your requirements and we will send complete data on an A.E.F. Mill to meet them.



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2610 DIVERSEY AVENUE • CHICAGO 47, ILLINOIS, U.S.A.

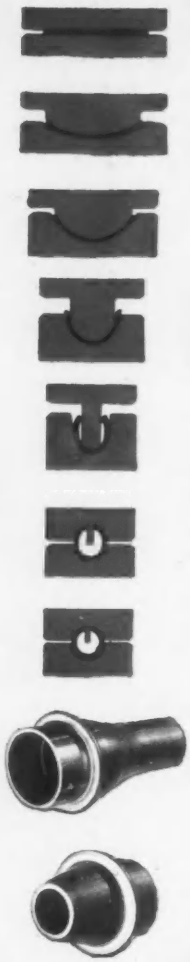
Cable Address: AEFCORP, Chicago

Printed in U.S.A.

BRIEF FACTS . . .

7-STEP FORMING

The seven stages in forming flat strip into tubular form on an A.E.F. Medium Wall Mill are illustrated at the right. Four sets of side forming rolls are also furnished. Following the welding operation, finishing and sizing are accomplished by means of five additional sets of rolls—producing perfectly rounded pipe or tubing.



WORKABILITY

The finished pipe or tubing possesses the same strength and qualities as the original strip from which it is formed and the welded seam has a greater strength than the parent metal. It can be swaged, drawn, bent, upset, flanged or worked into special shapes without danger of fracture at the welded seam.

MEETS PIPE SPECIFICATIONS

Pipe produced on an A.E.F. Tube Mill will meet all pressure tests and specifications for electrically resistance welded American standard weight pipe.

COSTS LESS

Installation of an A.E.F. Mill represents a fraction of the investment necessary for comparable production of pipe or tubing by any other method.

BUILT IN THREE SIZES

1. 60 KVA Light Wall Mill produces tubing with wall thicknesses from .025″ to .093″ and outside diameters from ½″ to 2½″; with slight modification at factory, limits can be extended to make tubing up to 3″ O.D.

2. 170 KVA Medium Wall Mill produces American standard weight pipe from ½″ to 2″, as well as mechanical tubing up to 4″ O.D. with maximum wall thickness of .156″.

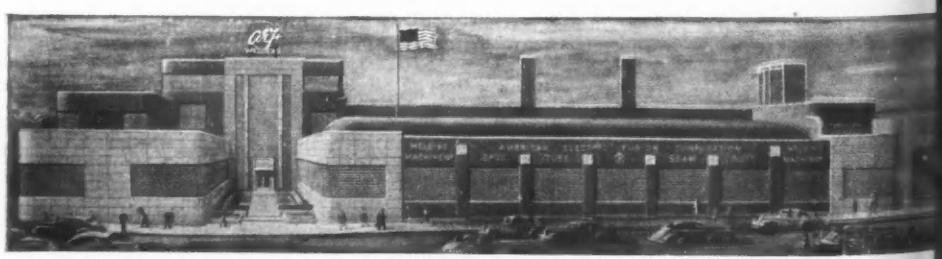
3. A.E.F. Heavy Wall Mill produces tubing up to 6″ O.D. Detailed information on request.

DATA ON REQUEST

For complete data and literature on A.E.F. Tube Mills, submit information regarding the sizes and quantities of pipe and tubing required, and the uses for which it is intended.

Resistance Welding Machines

Modern A.E.F. Resistance Welding Machines, Tube, Spot, Seam, Butt Welders are built in a modern, completely air conditioned factory.



A.E.F.

AMERICAN ELECTRIC FUSION CORPORATION

2610 DIVERSEY AVENUE • CHICAGO 47, ILLINOIS, U.S.A.

Cable Address: AEFCORP, Chicago

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General News

(*Continued from page* 23)

Detroit Steel Companies Bid for WAA Ingot Plant

Two Detroit steel companies have entered bids with WAA for purchase of a government-owned electric furnace steel ingot plant at East Chicago, Ind. The companies are McLouth Steel Co. and Rotary Electric Steel Co. Both companies reported that if their bid is successful they propose to move the plant to Detroit to supply steel for the automobile industry. The McLouth firm would turn out hot and cold rolled sheet and strip steel. Rotary Electric would use the facility for manufacture of sheet steel. A third bid was received from the International Rolling Mill Products, which would move the plant to Chicago.

GE Announces $25 Million Jet Center

Under construction for the past two years as part of General Electric Co.'s long-range expansion program in the jet propulsion field, a $25 million center at Lynn, Mass., for the development, testing, and production of aircraft jet engines has been announced. It has been described by the company's engineers as the world's largest and most complete plant for the development of improved and larger size aircraft turbine powerplants.

GM Drops 3% Rebate to Fleet Owners

GM has dropped its special three per cent rebate on sales of cars and trucks to fleet owners, it was announced recently in a letter to dealers and fleet owners.

Ford West Coast Purchases Up $12 Million in 1948

Ford Motor Co. has announced that purchases of materials on the West Coast this year will total more than $27 million, about $12 million above last year. Because of higher freight rates, Ford is attempting to make all possible purchases near its assembly plants. The company's yearly truck and rail bill currently is $20 million higher than it was 18 months ago, according to Victor G. Lottmann, director of Ford's purchasing research department. He reported that shipping costs from the East to the three West Coast assembly plants average about 10 per cent of production cost and that substantial savings can be made through local purchasing. An additional advantage would be savings in transit time which averages 10 days across the country.

GM's Harrison Radiator Div. Opens New Plant in N.Y.

GM's Harrison Radiator Div. has formally opened its newly expanded plant in West Lockport, N. Y.

CAA Approves Allison Jet for Commercial Transport Use

The Civil Aeronautics Administration has approved the first jet engine, an Allison Model 400-C4, for commercial transport use. The CAA Approved Type Certificate was issued for the Allison model on the basis of qualification tests for reliability and durability, identical to those required of any engine in commercial transportation.

Borg-Warner Div. Contracts To Make Ford Body Parts

The Ingerson Steel & Disc Div. of the Borg-Warner Corp. has entered into a long term contract with Ford for steel body parts for Ford and Mercury station wagons. Plans are under way for construction of three new buildings and installation of additional equipment at the plant in Kalamazoo, Mich., where work on the components has already started.

(*Turn to page* 86, *please*)

Exclusive NEW
FOUR UNIT FASCO SNAP-MOUNT
CIRCUIT BREAKER Now Available

● Now automobile headlights, windshield wiper, horn, heater and other electric equipment can be wired to one circuit breaker assembly, saving valuable assembly time and money. It's the dimples in the mount and circuit breaker case (shown in the magnified view) that give the snap action and speed up production. Circuit breakers snap into the mount securely and quickly, *by finger pressure.* No spot welding. No screws. No tools needed. *And,* if desired the mount can be attached to the car body . . . the circuit breakers assembled on the wiring harness, and snapped into the mount when the car is wired. Engineered and made to last the life of the car. Write for further information, or phone our Detroit office, 6432 Cass Avenue, Detroit 2, Michigan. Phone Madison 6300.

FASCO
CIRCUIT BREAKERS

©1948

Safeguard Operation of Automotive Electrical Equipment Instantly . . . Automatically . . . from Dangerous Overloads or Short Circuits.

F. A. SMITH MANUFACTURING CO., INC., ROCHESTER 2, N. Y.

Electrical Engineering and Manufacturing Serving the Automotive Field for 26 Years

General News

(*Continued from page* 85)

Automotive Advertisers Name ASI Show Committee

The Automotive Advertisers Council has named a special committee to handle promotion and publicity for the Automotive Service Industries Show in 1948, Walter Kirkpatrick, Council president and manager of advertising and sales promotion, Wilkening Mfg. Co., stated recently. R. E. Conley, Jr., advertising manager, R. M. Hollingshead Corp., who last year headed the council's publicity on the Show, has been named General Chairman of the Show Committee. The members of the three subcommittees follow:

Publicity: R. E. Conley, Jr., chairman; Trade Magazines, Edward F. Todd, advertising manager, The Imperial Brass Mfg. Co.; Direct Mail and Trade Space, Lester C. Dobrunz, advertising manager, Wagner Electric Corp.; National Magazines, Don L. Hague, advertising manager, Zerone-Zerex Div., E. I. du Pont de Nemours & Co., Inc.; Newspapers, Duane Jones, advertising manager, United Motors Service Div. of General Motors Corp.; Radio, Television & Newsreels, Carl McWade, advertising manager, Skilsaw, Inc.

Theme & Decoration: Herman Teetor, advertising manager, Perfect Circle Corp., chairman; H. C. Mohr, Packard Electric Div. of General Motors Corp.; J. F. Apsey, Jr., Black & Decker Mfg. Co.; O. R. McDonald, Brunner Mfg. Co.; Stuart Phillips, Dole Valve Co.; R. M. Schutz, Maremont Automotive Products; Albert Joseph, AP Parts Corp.

Badges and Attendance Records: Carl B. Dietrich, Accurate Parts Mfg. Co., chairman; W. K. Ryan, Inland Rubber Co.; J. M. Warnimont, Sterling Tool Products Co.; S. R. Robinson, U. S. Asbestos Div.; A. A. Ballantyne, Electric Auto-Lite Co.; P. C. Poss, assistant advertising manager, Timken Roller Bearing Co.

1948 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total 1948	Total 1947
January	305,081	99,200	1,370	405,651	347,696
February	274,847	107,054	1,090	382,991	373,360
March	349,998	140,606	1,409	492,013	421,180
April	308,071	128,963	1,048	438,082	423,399
Total—4 Months	1,237,997	475,823	4,917	1,718,737	1,565,635

1948 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	285,373	19,708	83,893	15,307	1,068	302
February	256,753	18,094	88,889	18,165	752	338
March	327,198	22,800	118,572	22,034	1,202	207
April	288,356	19,715	111,911	17,052	902	146
Total—4 Months..	1,157,680	80,317	403,265	72,558	3,924	993

*—Automobile Manufacturers Association.

Specifying springs and wireforms for exacting applications very often is a feverish task. In a substantial number of spring-buying plants specifications and purchases are made for springs that habitually include "fancy" and expensive design characteristics such as close tolerances, ground-ends, fancy hooks, etc. In many, many cases equally efficient but more economical springs could be used to do the job just as well.

By calling in a specialist—the Lewis Spring Engineer—to diagnose the conditions and requirements of your spring applications, it is possible to eliminate costly specifications that are not absolutely necessary because Lewis Spring Engineers are thoroughly familiar with all phases of spring design and applicability to products. Time after time they have saved manufacturers thousands of dollars by recommending and supplying the most practical, economical springs and wireforms for the jobs to be done.

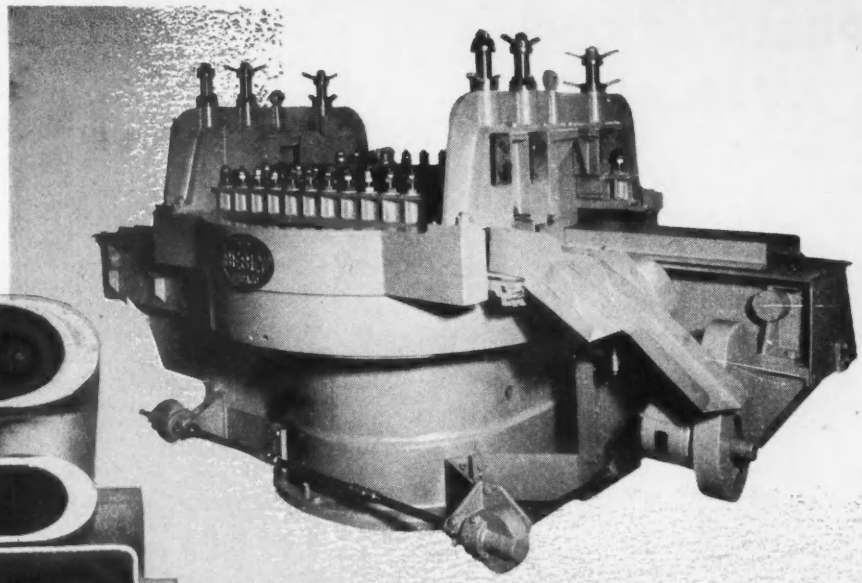
To lower the unit cost of your products without lowering product quality, have a Lewis Spring Engineer give your products a spring checkup. There's no obligation—and it may be surprising the savings he can make for you.

LEWIS SPRING & MANUFACTURING COMPANY
2644 WEST NORTH AVENUE CHICAGO 47, ILLINOIS

Lewis PRECISION SPRINGS
THE FINEST LIGHT SPRINGS AND WIREFORMS OF EVERY TYPE AND MATERIAL

M. E. Coyle, executive vice president of General Motors Corp., is shown at the right being congratulated by Walter S. Carpenter, Jr., at the left, chairman of the board, E. I. duPont de Nemours & Co., Inc. upon Mr. Coyle's receiving the 1948 Parlin Memorial Award recently in Philadelphia for distinguished contributions to marketing.

BIG



or small . . .

A Besly Grinder Grinds Them All *for*

BESLY GRINDERS

APPLETON ELECTRIC PRODUCTS — REG. U.S. PAT. OFF.

No. 372-53" Besly Vertical Spindle Disc Grinder equipped for grinding UNILETS manufactured by the Wisconsin-Appleton Co. at South Milwaukee, Wis., operated as Plant 2 of the Appleton Electric Company, Chicago, Ill. All sizes are handled on this one grinder. Production rate varies from 100 — 200 pieces per hour for the 4" size to 1800 pieces per hour on smaller sizes.

The unusual versatility and adaptability of Besly Grinders is revealed by this standard-type Vertical Spindle Disc Grinder equipped with a special power-driven three-channel continuous chain feeder unit. Now, the Appleton Electric Company can finish *all* Rectangular and Form 35 UNILETS on one grinder.

A single pass produces the required smooth, flat surface.

Talk It Over with a BESLY ENGINEER!

Many equally productive applications are possible with this basic design. Perhaps a 372-53" Besly is the answer to your production problem. Why not discuss the possibilities with a Besly engineer?

You'll Do BETTER with BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY AND COMPANY • 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

PUBLICATIONS AVAILABLE

(*Continued from page* 56)

after" installation of the new model Hydrovac.

H-154—Drill Jigs

Acme-Danneman Co., Inc.—Catalog No. 49, a comprehensive 16-page booklet, covering the Esco line of standardized drill jigs, describes more than 50 standard styles and sizes. It is well illustrated and contains full engineering data that will be helpful to the tool engineer and designer.

H-155—High-Temperature Alloys

Haynes Stellite Co.—A new 87-page book entitled Haynes Alloys for High-Temperature Service contains all available data on Haynes alloys. A general description of each Haynes alloy is included, together with tables giving chemical composition and physical properties. Mechanical properties are presented in both tabular and graphic form. Short-time tensile properties and stress-rupture properties of all the alloys are also compared in graphs.

H-156-O-Rings

The Parker Appliance Co.—A new 12-page catalog, No. 901, covers synthetic rubber O-Rings for aircraft and industrial use. General aspects of O-Ring sealing, with application information, dimension and selection tables covering 88 ring sizes and listing gland, cylinder bore, piston groove and piston rod diameters for each size, are included. Information on service characteristics is also given.

H-157-Cooling Units

Young Radiator Co.—The new line of giant-sized VAD (Vertical Air Discharge) Cooling Units is described and illustrated in catalog No. 448. It contains illustrations, diagrams and dimensions, descriptions of the units which are available, application photographs, etc.

H-158-Unit Heaters

Young Radiator Co.—Catalog No. 2648, a 16-page booklet describes the company's new line of circular Vertiflow Unit Heaters. It contains complete descriptive and illustrative data and includes diagrams, performance data, etc.

H-159—Nickel Silver Rods

Titan Metal Mfg. Co.—Titan Nickel Silver and Nickel Brass Rods, extruded shapes, forgings and die castings are illustrated and described in a new folder published by the company. Analyses, physical properties and corrosion tests for four nickel silver alloys and two nickel brass alloys are included.

H-160—Speed Selector

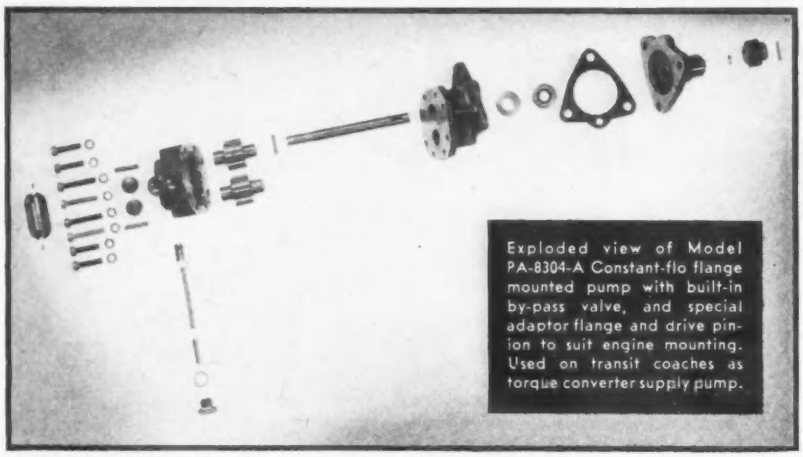
The B. F. Goodrich Co.—A new broadside on the Speed Selector has been issued. It describes the principles of operation, pictures some recent applications and lists a large number of machines on which it can be utilized. Data tables are included.

H-161—Carbide Tools and Tips

Metal Carbides Corp. — Catalog 48-T, a new revised Tool Catalog, covers Talide Tungsten Carbide Tools and Tips. It gives the new standard identification numbers recently adopted by the carbide industry. Several new styles and sizes of cutting tools and tips are included.

John S. BARNES

Constant-flo
ROTARY GEAR PUMPS



Exploded view of Model PA-8304-A Constant-flo flange mounted pump with built-in by-pass valve, and special adaptor flange and drive pinion to suit engine mounting. Used on transit coaches as torque converter supply pump.

SIMPLICITY - plus EXPERT ENGINEERING - plus QUALITY CONSTRUCTION insures PERFORMANCE

The design simplicity of the Barnes Constant-flo Rotary Gear Pump gives you (1) the low per unit cost made possible by mass production methods; and (2) the maximum operating efficiency achieved only by craftsmen working to split-thousandths tolerances.

Expert engineering, characteristic throughout, is exemplified by the choice of cast iron for gears and housing — giving equal expansion from low to high temperatures. This results in high volumetric efficiency at standard pump speeds over a wide temperature range with low viscosity fluids, because minimum clearances can be maintained.

Only Barnes pumps offer the unique patented Barnes tooth structure. Effective pressure control with wide engine speed variations is attained with the Constant-flo by-pass valve. A specially-designed, spring-loaded, synthetic seal has earned Underwriters' approval.

High performance with long life is the result of Barnes design and construction. Barnes Constant-flo Rotary Gear Pumps, available in sizes from 20 to 360 GPH, perform satisfactorily even at 500 PSI constant duty.

Write today for descriptive literature and engineering data sheets suggesting numerous applications.

JOHN S. BARNES CORPORATION
301 S. Water St., Rockford, Illinois

Compact, Efficient, HIGH QUALITY, Long-Life Oil Pumps

PERMANENT RESILIENCE

Resilient parts made from HYCAR synthetic rubber *stay* resilient. That's partly because of HYCAR's unusual chemical stability—its resistance to oil and gas, acids and most other chemicals. And parts made from HYCAR are extremely resistant to the effects of oxidation, sunlight, and normal aging. A HYCAR sealing ring, for example, will maintain a positive seal through years of service even when constantly exposed to oils and acids inside the pipe, and sunlight and salt air outside.

Other unusual and valuable properties are listed in the box at the right. But most important, these properties may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part. Parts made from HYCAR have seen service in *every* industry, giving long life, dependability, and economical operation.

That's why we say ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Dept. HD-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. *EXTREME OIL RESISTANCE — insuring dimensional stability of parts.*
2. *HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.*
3. *ABRASION RESISTANCE—50% greater than natural rubber.*
4. *MINIMUM COLD FLOW—even at elevated temperatures.*
5. *LOW TEMPERATURE FLEXIBILITY—down to —65° F.*
6. *LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.*
7. *AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.*
8. *HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.*
9. *NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)*

Hycar

Reg. U. S. Pat. Off.

American Rubber

B. F. Goodrich Chemical Company

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

PAGE

Stainless Steel WIRE

● ROUND

— FLAT

OR

SHAPED

"Page for Wire—Especially Stainless"

Remember that the next time you are looking for a responsible source for stainless steel wire. Wire has always been the business of PAGE. And ever since its earliest development, PAGE has been working with stainless.

Whatever problem you may have involving wire—

Get in touch with Page!

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Pittsburgh, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

In Business for Your Safety

Business in Brief

Written by the Guarantee Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

Moderate increases in general business activity are indicated. The *New York Times* index for the week ended May 22 stands at 150.7, as against 148.9 for the preceding week and 146.4 a year ago.

Sales of department stores during the week ended May 22, as reported by the Federal Reserve Board, equaled 295 per cent of the 1935-39 average, as compared with 293 in the week before. Sales were seven per cent above the corresponding distribution a year earlier, as against a preceding similar excess of eight per cent. The total in 1948 so far reported is six per cent greater than the comparable sum in 1947.

Electric power production decreased slightly in the week ended May 8. The output was 9.1 per cent above the corresponding amount in 1947, as compared with a similar advance of 10.7 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 879,158 cars, 3.7 per cent more than the figure for the week before and 1.3 per cent below the corresponding number recorded in 1947.

Crude oil production in the week ended May 22 averaged 5,439,200 bbl daily, or 16,600 bbl more than the preceding average and 414,350 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended May 22 is estimated at 13,670,000 net tons, three per cent more than the output in the week before. The total production in 1948 so far reported is 14.4 per cent below the corresponding quantity in 1947.

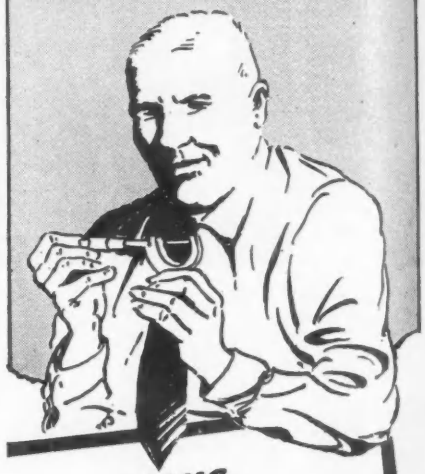
Civil engineering construction volume reported for the week ended May 27, according to *Engineering News-Record*, is $189,903,000, or 130 per cent more than the preceding weekly figure and 163 per cent above the comparable sum in 1947. The total recorded for 22 weeks of this year is 27 per cent more than the corresponding amount in 1947. Private construction is 0.2 per cent above that a year ago, and public construction has increased by 67 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended May 22 is unchanged at 163.5 per cent of the 1926 average, as compared with 146.9 a year ago.

Member bank reserve balances increased $395 million during the week ended May 26. Underlying changes thus reflected include an advance of $527 million in Reserve bank credit and a rise of $176 million in Treasury deposits with Federal Reserve banks, accompanied by an increase of $10 million in money in circulation.

Total loans and investments of reporting member banks increased $282 million during the week ended May 19. A decline of $47 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $14,208 million, shows a net increase of $2351 million in 12 months.

"THERE JUST ISN'T ANY 'ONE-SHOT' CUTTING FLUID"



...says "CHIP" WRIGHT

"You know, I've been around shops a long time and I've seen more than one man who thought he had a cutting fluid that could be used for everything. But, it just doesn't work that way. When you overdo standardization or simplification, trouble develops. Speeds, feeds, materials, tolerance and finish requirements all help determine the correct cutting fluid for the job. Because of this, I have found it best to rely on the recommendations of experienced cutting oil people. It's false economy to over-standardize or over-economize when it comes to cutting fluids."

—Chip

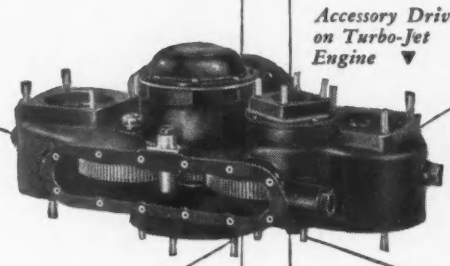
A Word About SOLVOL water-mixed cutting compound

SOLVOL, D. A. Stuart Oil Company's modern water-mix compound, will solve some of your machinery problems, eliminate some of your headaches. SOLVOL is more than just a high grade emulsifiable cutting fluid. It is a unique product incorporating extra cutting qualities which enable it to perform metal cutting jobs beyond the scope of other soluble products. Write for SOLVOL Booklet.

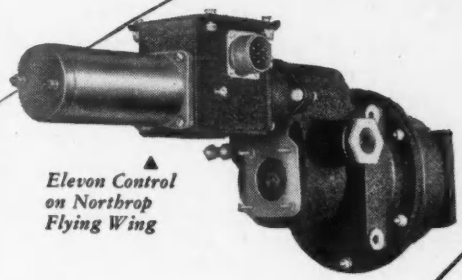
Another Time-Tested Stuart Product

D.A. Stuart Oil CO.
EST. 1865 LIMITED

2733 SOUTH TROY STREET, CHICAGO 23, ILL.



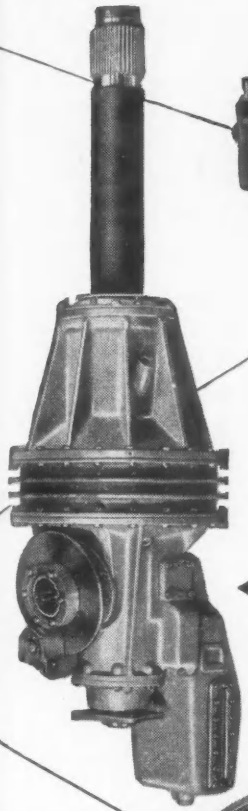
Accessory Drive on Turbo-Jet Engine ▼



▲ Elevon Control on Northrop Flying Wing

"Packaging" Gears

...FOR BETTER PERFORMANCE!



◀ Main Rotor Transmission on Sikorsky Helicopter

Performance of high-quality gears is affected in no small measure by the accuracy of their assembly and the precision of their mounting in their housing. Many manufacturers, recognizing this, look to Foote Bros. for complete units ready to install in the equipment they manufacture.

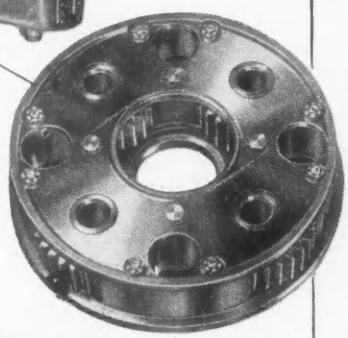
The wide experience of Foote Bros. in the production of equipment to transmit power, to reduce or increase speed, or to provide control, may be of assistance to you.

Foote Bros. Actuators and Power Units may be designed to meet virtually any practical limitation in space or weight. The "A-Q" (aircraft quality) Gears used in their construction permit operation at extremely high speeds, assure low noise level and provide unusually high efficiency.

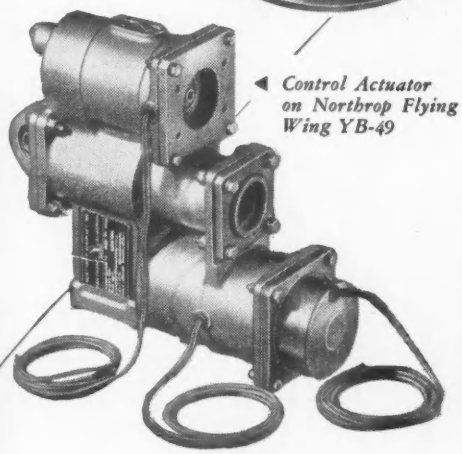
Speed Reducers for general commercial applications are available in both helical and worm gear types in a wide variety of sizes and ratios.

Foote Bros. engineers will gladly recommend the type of unit best suited to your needs or will work with you on the development of units for any special application.

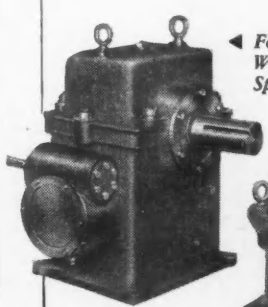
FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. F, 4545 South Western Blvd. Chicago 9, Ill.



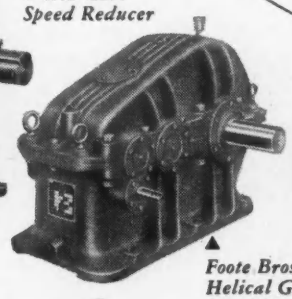
Planetary Transmission on Piasecki Helicopter ▶



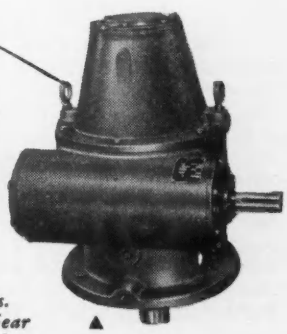
◀ Control Actuator on Northrop Flying Wing YB-49



◀ Foote Bros. Worm Gear Speed Reducer



▲ Foote Bros. Helical Gear Speed Reducer



▲ Foote Bros. Vertical Speed Reducer

FOOTE BROS.

Better Power Transmission Through Better Gears

1949 Military Aircraft Program

(*Continued from page* 41)

on a sub-contractor basis. So that it looks like an all-airframe manufacturer program.

Manufacturing Costs Double

Manufacturing costs have doubled since the war days. Costs per airframe pound averaged about $12 during the war with one high-quantity plane running as low as $5 per pound for airframe alone. Current costs run about $22 per airframe pound and about $45 per pound for the complete airplane equipped for flight. This means that although the dollar volume of the new program is record-breaking, the aircraft units are surprisingly low.

Although no two of the new contracts will read exactly alike, all of the new contracts will contain a renegotiation clause. Although this may seem superfluous since the Renegotiation Act over-rides any and all Government procurement contracts, Air Force and Navy must put them directly into each contract. The new contracts will generally be of the cost-plus-fixed-fee type but "cost" will have a brand new meaning. The new accounting system will require closer attention to costs, more policing of the contractors plant, periodic renegotiation of prices and closer attention to costs not specifically analyzed in the contract.

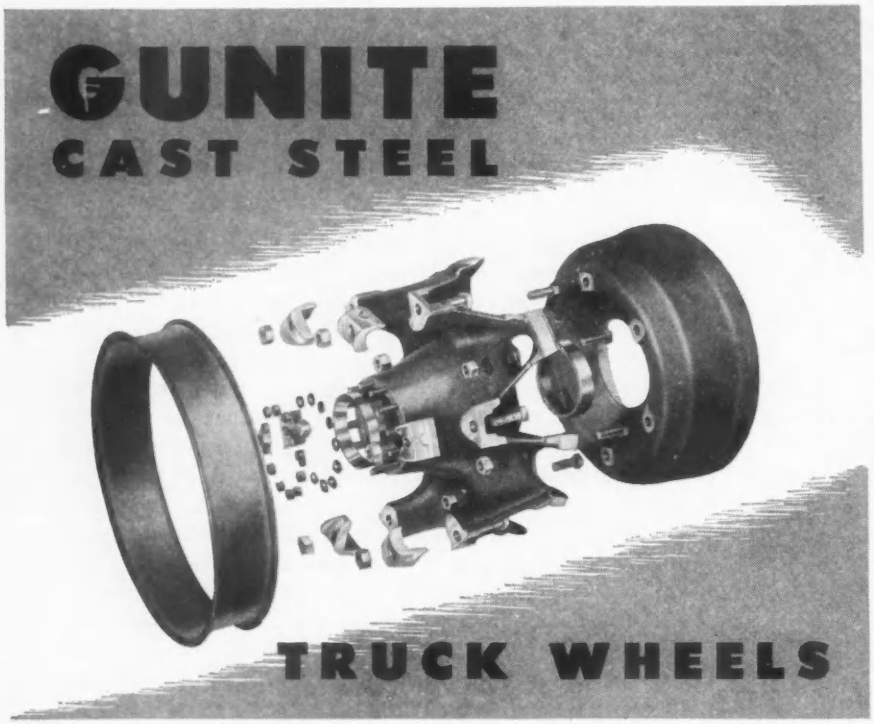
The following amounts will not be allowed as costs under the new contracts: advertising; interest on borrowed money; fees, commissions, bonuses or premiums paid in connection with negotiations for a procurement contract; entertainment expenses; donations, dues and memberships unless specifically provided for in the contract (Aircraft Industries Association dues will be allowed it is understood); expenses, maintenance and depreciation of facilities excess to the contract with the exception of "reasonable" stand-by facilities; fines and penalties; losses on other contracts; losses from sale or exchange of capital assets such as real property, securities, etc.; expenses arising from strikes; increases in reserve accounts for contingencies; life insurance premiums on corporation executives or persons financially interested in the corporation; federal and state income and excess profits taxes; bond discount or financing charges; taxes and expenses on issues and transfers of capital stock or bonds; bad debt losses or charges to reserves for that purpose; inter-company profits such as between parent company and subsidiary, and intra-company profits such as between different divisions or branches of a single organization.

This new list of unallowable costs will require a new and extremely complex accounting system. While any of the foregoing items present genuine difficulties, a good example is the shop in which both commercial and military business is being processed for which many, many parts are identical and on the commercial portions of which a loss is being shown. To separate and pro-rate the costs will prove a formidable task. Bookkeeping will have to be tightened up and far more detailed records kept...

Benefits for Contractor

Simultaneously, however, the new rules provide many new benefits for the contractor. For example, the contractor is enabled to buy and install the tooling required for the contract for which he will be paid as soon as the costs are approved by the procurement officer, in bold contrast to the wartime problem of operating in the red for months or even years until tooling costs had been paid for out of production deliveries. The removal of this tooling cost amortization means that the contractor will start showing a profit

(*Turn to page* 96, *please*)



NOTE THESE DISTINCTIVE FEATURES

CONTINUOUS WEB. The alternated bearing surfaces for the inside and outside rims are supported by a continuous web which constitutes the spoke walls. This web gives the assembly a structure closely resembling that of a heavy girder with its strong and sturdy diagonal bracing.

UNIFORM STRESS DISTRIBUTION. The strength and stiffness of this wheel is such that the alternating stresses have little chance to develop common failures. Sudden stresses, especially characteristic of winter driving, are absorbed in the continuous web, so there is no flexing of the spoke walls. An effectively straight-line distribution of the forces from the rims to the bearings directs the stresses on the bearings uniformly, giving longer life.

FLOATING RIM BOLTS. The rim lugs are pulled down on bolts, rather than studs, to provide adaptability and uniformity of clamping — and particularly to permit quick and easy replacement. These bolts have proper clearance and are made of high-tensile steel, heavily plated to resist rusting.

SPACER. A conventional, rigid, channel-type rim spacer is furnished. This unit is strongly and accurately made to assure perfect alignment of the wheels.

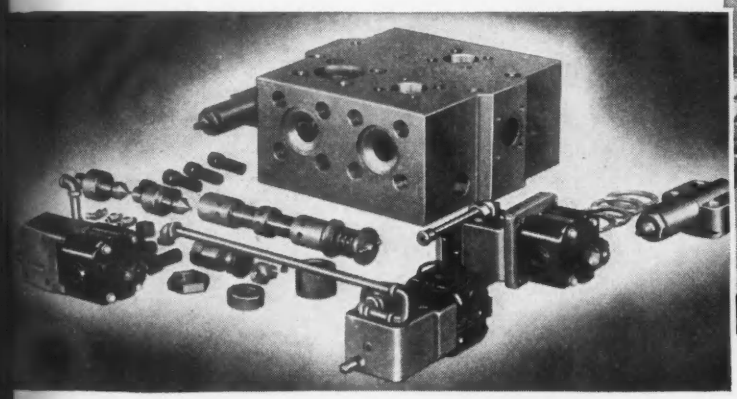
GUNITE BRAKE DRUM. Drums used on Gunite Wheel assemblies are the famous Gunite Brake Drums which have established a wide acceptance in the motor transport field. These drums will provide more efficient braking, more mileage, fewer repairs, lower cost, and will eliminate drum breakage troubles.

MADE BY
GUNITE FOUNDRIES
ROCKFORD, ILLINOIS

GUNITE WHEELS ARE CAST AND FINISHED IN GUNITE'S OWN FOUNDRIES AND MACHINE SHOPS

CMC
CLEARING
MECHANICAL & HYDRAULIC

INSET: Main operating valves of Clearing hydraulic systems are combined in a single forged steel block with ports and passages drilled from solid. Swift, automatic and safe performance of all hydraulic press functions is assured by this unique Clearing development.



HOW DO YOU MEASURE ECONOMY?

Substitution of press methods for casting, machining, or other slow means of manufacture will almost invariably result in a substantial saving in production costs. But whether such a step gives you maximum economy depends upon how efficiently you are able to operate your presses.

Don't be content with "a saving." Get *all* the saving you can, while you're at it. Consider die life, press output, operating and maintenance costs. Don't forget that delays and extra work in assembly should be charged to press costs if they are due to inaccurate or varying stampings.

Proper consideration of all pertinent factors will lead you most often to Clearing presses. That's a statement that's hard to explain but easy to prove. We'll be glad to prove it to your satisfaction—and to your profit as well. Put your problem up to our engineers.

CLEARING MACHINE CORPORATION • 6499 W. 65th St., Chicago 38, Ill.

CLEARING THE WAY TO EFFICIENT MASS PRODUCTION

CMC
CLEARING

THE NEW WESTINGHOUSE "65" FLEXARC

. . . a 65-volt Industrial A-c Welder, with Stabilized Arc

The new Westinghouse "65" Industrial A-c Welder is producing better, faster and cheaper in many fields of metal fabrication. Here two of them take their place in the automobile production line of the Hudson Motor Car Company, Detroit.

Built to operate with an open-circuit, secondary voltage of *only 65 volts* . . . with uniform, *continuous* current adjustment . . . the Flexarc "65" overcomes the problems of arc instability which formerly limited the use of lower a-c voltages for heavy-duty industrial welding.

WESTINGHOUSE FOR SUPERIOR WELDING

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Are you getting your share of

$21,600,000 SAVINGS PER YEAR

made possible by A-C welding?

4 out of every 5 welders in use today are d-c. Yet, actual operating figures prove that a-c welding is faster, cheaper and better.

It's time to forget old concepts of welding costs and efficiency—to reverse this ratio of a-c to d-c equipment in line with proved operating results. The potential savings are startling—conclusive evidence that you cannot afford to continue using d-c welding extensively.

SAVINGS IN WAGES—

Because a-c welding is 20% to 30% faster, permitting excellent welds at higher speeds on all classes of work, nearly $1,240,000 *monthly* can be saved in labor costs (at $1.50 per hour).

SAVINGS IN POWER—

Because a-c welding requires less power, giving 85% to 90% efficiency as against 55% to 65% for d-c machines, the potential *monthly* power saving is over $500,000 (at 2c per kilowatthour).

SAVINGS IN DEPRECIATION—

Because fewer a-c machines are required, potential savings of more than $18,800 per month can be realized (based on a capital charge of 1% per month).

SAVINGS IN MAINTENANCE—

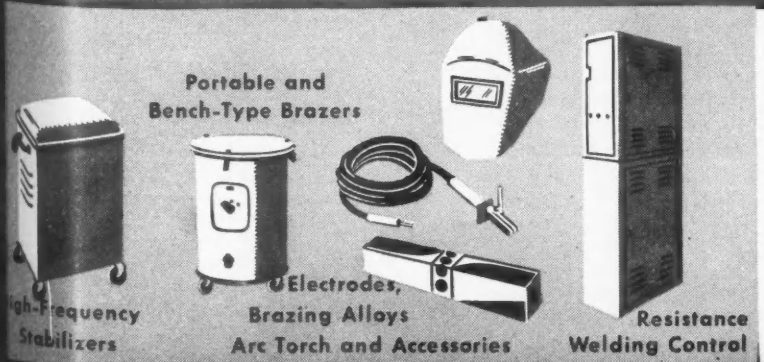
Because a-c welders require less maintenance, potential monthly savings on maintenance total more than $60,000.

These add up to total monthly savings of more than $1,800,000, or $21,600,000 per year. These are "boxcar" figures, but they are backed up with facts.

A Westinghouse welding specialist is ready to give you these facts, and to show you actual dollars-and-cents savings possible in your plant by replacing d-c welders with modern a-c welding techniques and equipment.

Get in touch with your nearby Westinghouse office, and ask a welding sales engineer to call. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21449

EVERYTHING for Welding ANYTHING!



MAIL THIS COUPON

Westinghouse Electric Corporation
P. O. Box 868, Pittsburgh 30, Penna.

YES—send me details on the new Westinghouse "65" A-c Welder—also on items checked.

- ☐ Automatic Welding Equipment
- ☐ Engine-driven Welders
- ☐ HF Stabilizers
- ☐ Brazers
- ☐ Electrodes
- ☐ Resistance Welding Control
- ☐ D-C Welders

Name _____

Company _____

Address _____

Convenient, comfortable

Hotel Cleveland

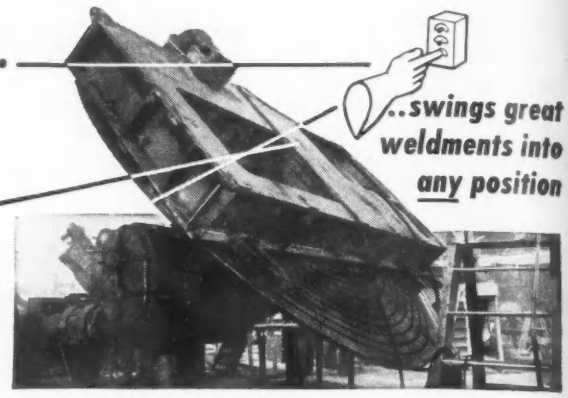
WHEN convenience counts and comfort is important you'll appreciate the central location, the friendly hospitality, the cheerful, modern rooms of Hotel Cleveland.

Hotel Cleveland is at the very heart of Cleveland, convenient to Public Auditorium, Stadium, stores, office buildings. Union Passenger Terminal, Terminal office buildings, and garage are all connected to Hotel Cleveland by covered passage.

★ *Write for reservations. Best choice of rooms Thursday through Monday.*

HOTEL CLEVELAND
Cleveland, Ohio

A TOUCH...



..swings great weldments into any position

When welders can swing tons of weldment into any position for the next downhand pass quickly and safely, with a touch on the push button control, they are able to work better, faster and more economically, no matter what the job. Interruptions in any welding operation are costly—when welders or their helpers must prop up, flop, turn over, crawl under, over and around a weldment, they are adding costs to the job. Because more and more welding is being done in today's production, it is important that your welding costs and quality be examined in the light of economies and improvements made possible by C-F Positioners.

Not only do C-F Positioners give welders more time for welding by permitting them to swing weldments into the correct position for a downhand pass, they make all welding better and more economical by making possible the use of heavier electrodes, eliminate "overwelding" and waste of power and materials. Write for illustrated Bulletin. Cullen-Friestedt Co., 1322 S. Kilbourn Ave., Chicago 23, Ill.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

(*Continued from page* 92)

as soon as units begin rolling off the production line and that profits will be shown regardless of the size of the contract. In those cases where the company desires to own the tooling for future commercial use, the Government will pay its pro-rata share of their useful life. The following items will be allowable as costs under the new program: normal depreciation of fixed assets; depletion of natural resources; bank service charges; employes group pension and retirement expenses; employes welfare expenses; employes vacation pay; royalties and license fees; legal, accounting and other professional fees for services rendered; self-insurance programs; uninsured losses; premiums for performance bonds; necessary management expenses such as director's and executive committee's fees and expenses of stockholders meetings and annual reports; amortization of patents, rights, designs and drawings related to the contract; amortization of dies, patterns and special tools, "reasonable" salaries and payments to partners, corporate officers, etc.; overhead of engineering department; research and development expenses and expenses incurred in anticipation of the contract. Obviously, these costs will not be allowed per se but only upon approval of the procurement officer or when specifically covered in the contract.

It is in view of the foregoing that the aircraft manufacturing industry is not singing "Happy Days Are Here Again" but, on the contrary, is studying the new program in great detail and with due regard to the contingencies inherent in its enactment. It assures this nation the "essential nucleus" of an aircraft manufacturing industry without which we would be fair prey for an aggressor and takes a substantial step towards providing the "air force in being" without which we could not even stave off the first wave of an attack. It is a step forward—but a business-like step. An industry, the services and the citizen alike hope fervently that it is a step towards peace.

Classified Advertisements

ENGINEER (HYDRAULIC) WANTED: EXPERIENCED HYDRAULIC ENGINEER FOR SMALL HYDRAULIC POWER DRIVEN APPLICATIONS. MUST BE THOROUGHLY EXPERIENCED IN THIS FIELD WITH PROVEN RECORD ACCOMPLISHMENT. GIVE FULL DETAILS IN FIRST LETTER. ADDRESS BOX 55, AUTOMOTIVE INDUSTRIES.

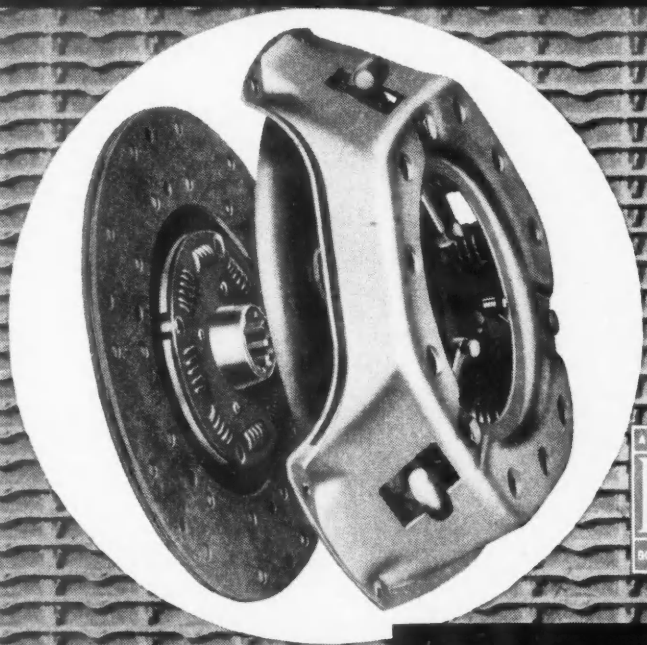
WANTED A well established Midwestern Corporation has an opening for an electrical engineer familiar with thermal type circuit breakers and related devices. The applicant must be capable of taking complete charge of a development program. Salary commensurate with ability and experience. Box 52, Automotive Industries, 5601 Chestnut St., Philadelphia 39, Pa.

Design . . .

Long clutch and radiator designs meet the specific requirements of individual applications. Our wide range of sizes and capacities serves practically every passenger car, truck, bus and tractor need—high-speed or heavy-duty. *Automotive engineers know this.* Since the earliest days of the automotive industry, they have specified Long clutches and radiators as original equipment for millions of units.

RADIATORS SINCE 1903

CLUTCHES SINCE 1922



A PRODUCT OF B-W BORG-WARNER

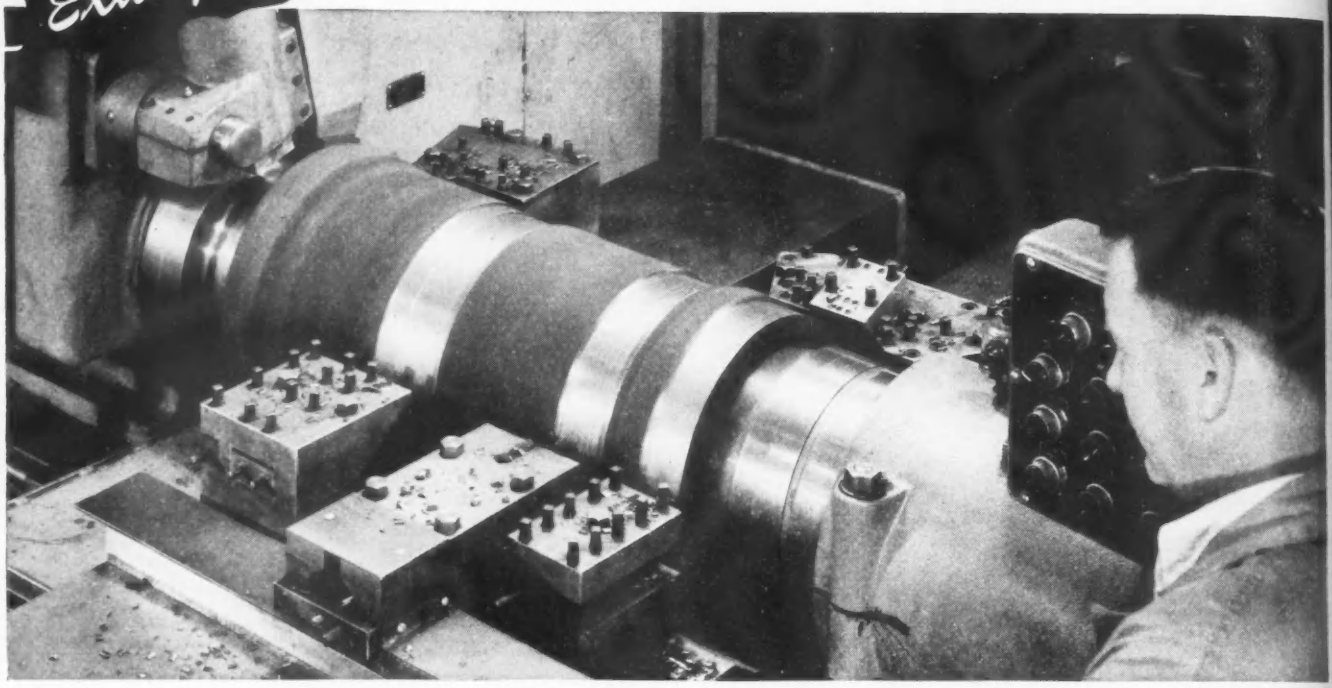
LONG

CLUTCHES • RADIATORS • OIL COOLERS

Long Manufacturing Division, Borg-Warner Corporation, Detroit 12, and Windsor, Ontario

Another Example of

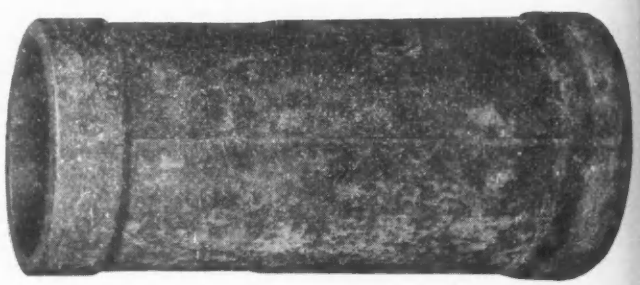
Profitable Multiple-Tool Turning of Short Runs on Large Parts...



Rough turning locomotive cylinder liner on Sundstrand Automatic Lathe. Machine has 75 H.P. spindle motor and parts are held by chucks on headstock and tailstock.

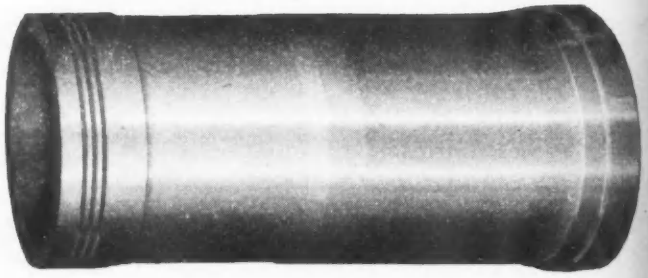
Sundstrand 75 H.P. Automatic Lathe Cuts Roughing Time from 60 Hours to 10 Hours...

This Sundstrand Model 16 Automatic Lathe has been tooled up for turning large cylinder liners. In spite of the fact that the parts are processed in lots of only 20 pieces, this one automatic lathe replaced four conventional type machines. With the old machines and method, the roughing time was 60 hours for 20 pieces. The Sundstrand Model 16 Automatic Lathe rough turns the same number of parts in only 10 hours, including set-up time.



Rough Cylinder Liner

Cylinder liner is 32" long by 15¼" diameter.



Rough Turned Cylinder Liner

Illustration above reveals surfaces machined in rough turning operation. Cylinders are processed in lots of 20.

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A. ·

RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

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Auto-
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RIES

Finishing Turning Time Cut From 24 hours to 8 Hours . . . . . .

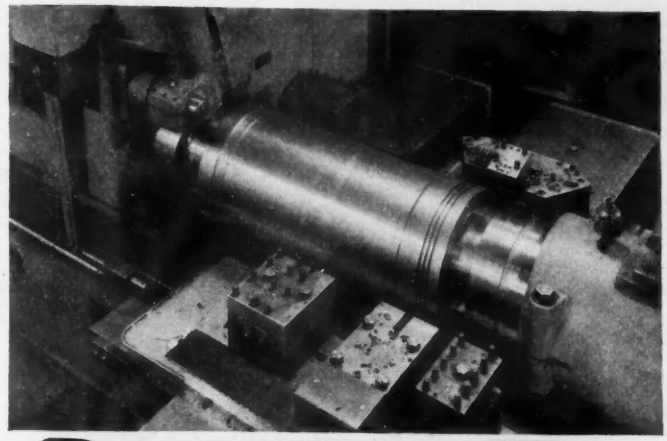
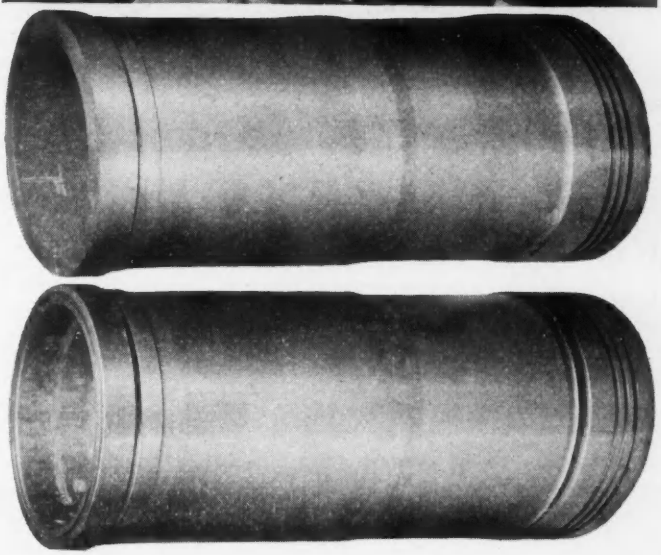


Illustration at right reveals tooling for finish turning operations. Tools are arranged on the slides for turning five different diameters and cutting three .253″ grooves in the O.D. An overhead attachment turns an additional groove in the end wall diameter.



Rough turned and finish turned cylinders. Note end groove in finish turned cylinder. Groove is machined by overhead attachment.

These 7 Lathe Design Features Make Savings Like These Possible . . .

These are the 7 features you get in the Sundstrand Automatic Lathe for turning short runs on large parts:

1. **QUICK CYCLE CHANGE** so that adjustments for various sizes and types of parts can be made in a hurry.
2. **SIMPLICITY OF ADJUSTMENT** so that operator can learn to make tool set-ups and change-over in a hurry.
3. **WIDE RANGE OF CARRIAGE CYCLES** easily adjusted for many different sizes of parts and types of tool actions.
4. **ADEQUATE POWER** so that multiple tooling can be used to shorten cutting time.
5. Adequate **FEEDS AND SPEEDS** suitable for the range in size of parts to be machined.
6. **AUTOMATIC CYCLING** for accurate duplication to close limits of all parts in the lot.
7. **HIGH RAPID TRAVERSE RATE** so that cutting tools can be advanced to the cut and returned in the least possible time.

FREE *ADDITIONAL DATA*

How you can save time on turning large parts is further explained in this free folder covering engineering data and specifications on the 75 horse power Sundstrand Automatic Lathe. Write for your copy today. Ask for bulletin 272.

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD ILLINOIS U.S.A.

SUNDSTRAND
MACHINE TOOL COMPANY
2571 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

BIRDSBORO
HYDRAULIC

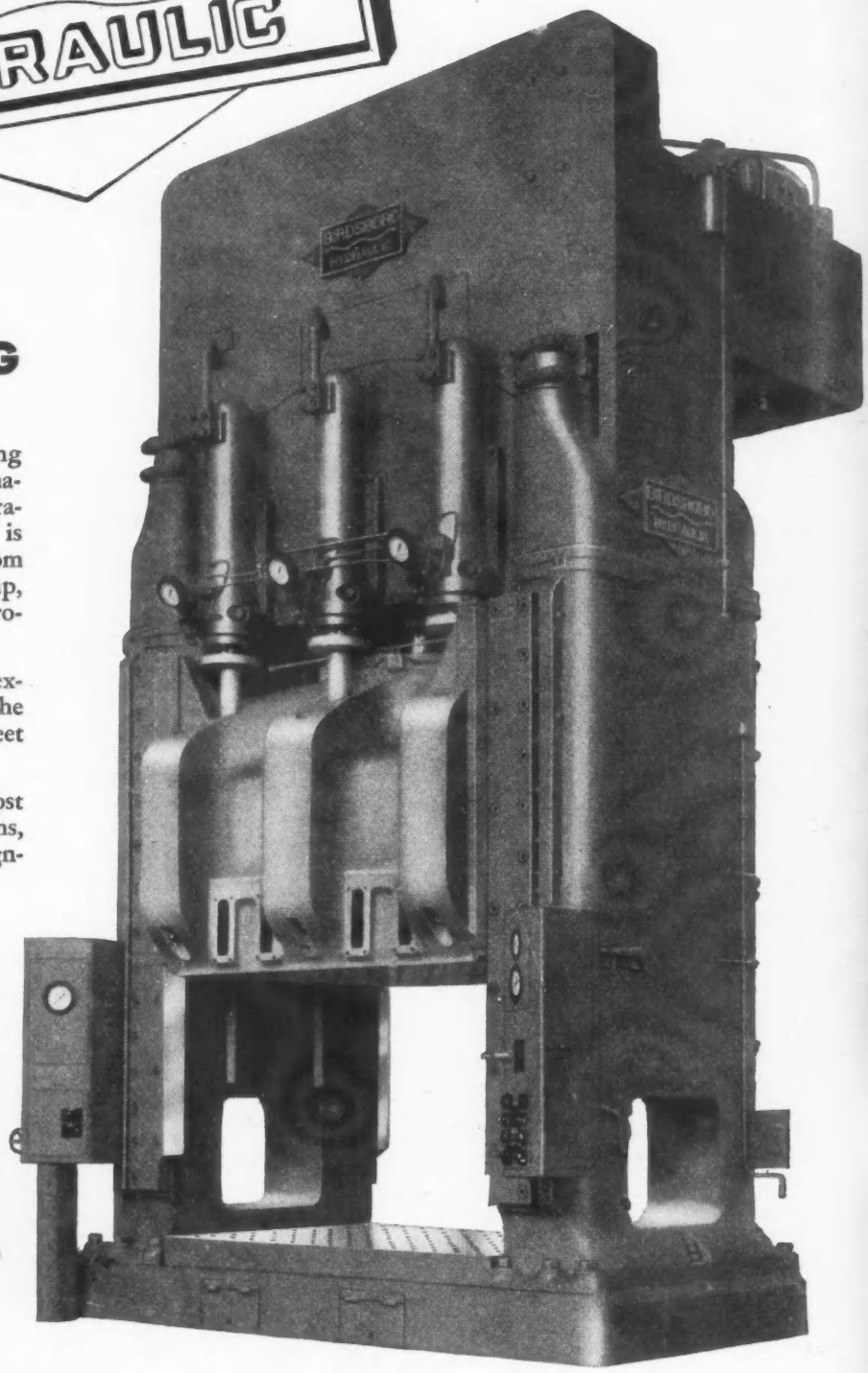
New

DEEP DRAWING PRESS

In this new hydraulic deep drawing press Birdsboro offers a *universal* machine which permits economical operation with large and small dies. It is designed for quick change over from single action to double action set-up, quick changing of dies and high production capacity.

The most outstanding feature is its extreme flexibility for adapting it to the different operations involved in sheet metal drawing.

If you're looking for fast, low cost production of large metal sections, take advantage of Birdsboro's design-engineering facilities today.



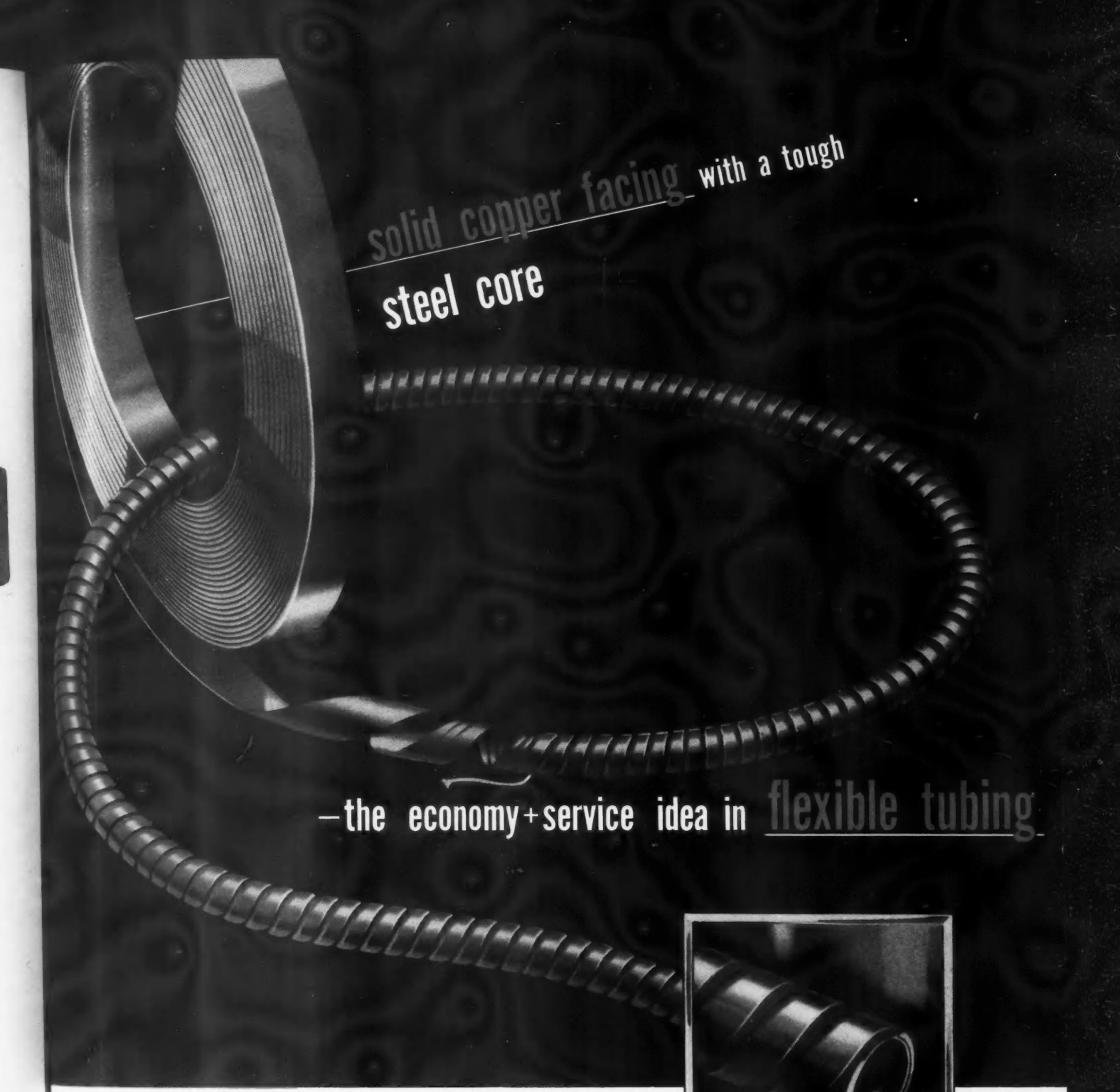
750-ton Triple Action Hydraulic **DEEP DRAWING PRESS** with bolster area 96" from right to left and 68" from front to back

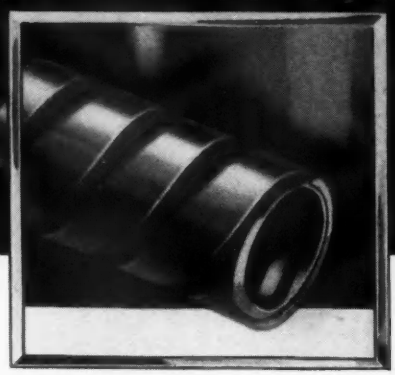
MP B-47

Birdsboro Steel Foundry & Machine Co. • Birdsboro, Pa.

BIRDSBORO
HYDRAULIC PRESSES

BUILDERS OF: Hydraulic Presses
Steel Mill Equipment • Rolls
Special Machinery • Crushing Machinery





SuVeneer

T. M. REG. U. S. PAT. OFF.

COPPER CLAD METAL

Simple—isn't it? Take an easy-handling coil of SuVeneer Copper Clad . . . twist and crimp it just so . . . and you have fine flexible tubing that is *strong* as its tough steel core, *resistant to corrosion* as its solid copper facing inside and out!

This is but an instance of SuVeneer Clad Metal's almost endless versatility . . . may we help you in developing your own profitable applications? Write.

Specialists in production of fine strip steels since 1892

- SuVeneer Clad Metal
- Stainless in all grades
- Alloys and Spring Steels

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

Rubber-mounted propeller shaft boxes on MACK TRUCKS

SKF Rubber-Mounted Propeller Shaft Boxes dampen noise and vibration of driving units carried from truck frame and body. The self-aligning ability of the SKF Ball Bearings inside them accommodates chassis weave and frame distortion. They require only occasional lubrication, and their maintenance costs are low. No wonder so many fleet owners agree that SKF-equipped trucks are the trucks for low mileage costs, schedules on schedule, and upped profits. 6469

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

● *Built by* MACK TRUCKS, INC.

QUALITY... to meet your specifications

HERBRAND PRECISION FORGINGS

Upset forgings . . . drop forgings . . . in any size or shape up to 200 lbs. . . . bearing the Herbrand "Diamond H" trade mark will fulfill every requirement of your products.

Strict adherence to specifications and contour effects a real economy in Herbrand Forgings by reducing machining and finishing operations to a minimum. And there's inbuilt stamina in every one, the result of scientific heat treating in the latest automatic electrically controlled furnaces.

Whatever your requirements in forgings, in orders of thousands or millions, Herbrand is your most faithful source of supply . . . as it has been for hundreds of industries since 1881. Your inquiries are solicited.

SINCE 1881

Herbrand

SUPER-QUALITY DROP FORGINGS

..the finest money can buy!

HERBRAND DIVISION

THE BINGHAM-HERBRAND CORP., FREMONT, OHIO

NOW... New Types of ELKONITE* METALS *for Light Duty Applications Like This*

FOR many years Elkonite metal has been the standard contact material for heavy-duty circuit interrupting equipment. A Mallory-developed material, Elkonite is famous for its hardness and electrical conductivity—for its resistance to sticking, to erosion by arcing, to mechanical wear and impact.

Now new grades have been developed for applications in the light duty field; applications like small relays, mechanical breakers, thermal breakers and similar equipment where silver alloys have heretofore been used.

Elkonite has an advantage over silver in that it is less subject to sticking and has a higher hardness. It is superior to most non-silver alloys in its improved finish and uniform contour, which requires no machining. And it is lower in cost than standard Elkonite—available in smaller sizes, too.

If you need contacts where the maximum physical properties of standard Elkonite grades are not required, yet where silver does not meet the specifications, here is something to investigate. These new grades of Elkonite are available in standard rivets and projection welding blanks—or can be used in special contacts made to your order. Write for more information.

The only volume of its kind in the world, this Mallory Contact Data Book contains everything you want to know about contact design, construction, applications and materials. Free to engineers who write on company letterhead. $2.50 to others.

Complete information on the Mallory line of contacts and contact materials will be found in this catalog.

ONLY MALLORY MAKES AND SELLS GENUINE ELKONITE METAL

P. R. MALLORY & CO. Inc.

MALLORY ELECTRICAL CONTACTS & CONTACT ASSEMBLIES

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NO-SHOCK LOADING

gives the driver sure, easy control

LIPE

TYPE ML

Clutch

HAS ONLY ONE SPRING

And this single spring operates twenty levers . . . all of them acting on the pressure plate at the same instant. This assures uniform pressure, absolute parallelism, and smoother engagement.

COOLER OPERATION

The 20 *louvred* levers act like a high speed fan-circulating air throughout the clutch assembly. This means less heat . . . no warpage.

EASIER ADJUSTMENT

The Lipe ML Clutch is easily adjusted by simply removing shims from the cover plate. This compensates for decrease in thickness of friction material. This does not affect dynamic balance of clutch. Instead, normal torque capacity is fully restored throughout life of friction material.

EASIER MAINTENANCE

The Lipe ML Clutch can be disassembled and reassembled with ordinary tools.

LONGER LIFE

Cooler, easier, smoother operation of the Lipe ML Clutch assures longer life with considerably less shock to the vehicle.

STOP shock loads! Keep controlability of your vehicle!
Cut your maintenance costs! Use the Lipe ML Clutch!

LIPE ROLLWAY

Lipe - ROLLWAY CORPORATION

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For Quick Stops...

Depend Upon

MIDLAND Air Brakes

MIDLAND'S diaphragm type compensating foot control valve releases any amount of air pressure desired — assuring quick emergency stops — controlling heaviest loads in congested city traffic or in hilly and mountainous driving.

Superior features of Midland Air Brakes include:

- Power by the most efficient compressor available today.
- Patented inlet valves assure maximum performance.
- Governor an integral part of compressor, operating directly on inlet valves.
- Compact, lighter — yet more efficient.
- Interchangeable in fleet operation.
- Backed by Midland's Factory Rebuilt Exchange Plan and national distributor organization.

Get complete information from your Midland Distributor, or write, wire or phone us.

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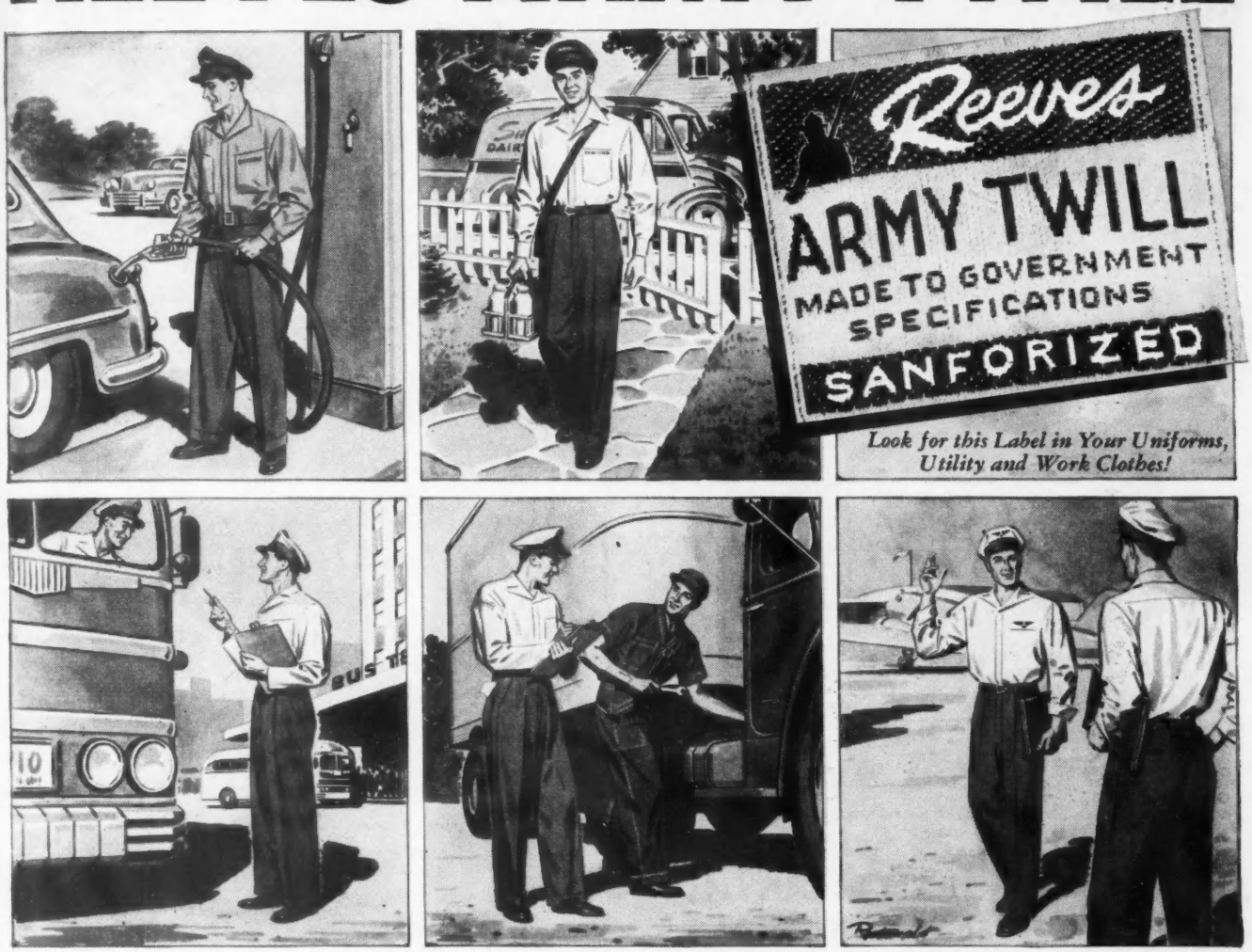
MIDLAND
POWER BRAKES

For That "NEW LOOK" In Uniforms Plus Extra Wear...

REEVES ARMY TWILL



Uniform designs by Helen Cookman. Pat. applied for.

TAKE THE FIRST STEP toward comfort, efficiency and economy by choosing Reeves Army Twill for your industrial uniforms. In addition, garments of this high-quality fabric have the "New Functional Look" thus boosting employee morale and winning public good will.

The high tensile strength of Reeves Army Twill assures rugged wearability with long-lasting economy. Its wide range of vat-dyed colors are fast to sun, water and perspiration. It retains smart tailoring after repeated washings. Remember—over 90 million yards of this same fabric helped equip America's fighting men—exceeded Government specifications under the toughest climatic conditions.

"FROM COTTON TO CUTTER"

SPINNING
WEAVING
DYEING
FINISHING
Reeves FABRICS

THE REEVES FABRIC GROUP INCLUDES:

Reeves Army Twill • Chesnee Gabardine • Reeveking Gabardine • Glengarrie Poplin • Marine Herringbone Byrd Cloth • Warrior Twill • Mountain Cloth Pima King Broadcloth • Reevecord • Parklyn Pique

MADE OF FINE COTTONS

REEVES BROTHERS, INC.

54 WORTH STREET, NEW YORK 13, N. Y.

REPRESENTATIVES IN: *Akron • Atlanta • Boston • Chicago • Dallas • Los Angeles • Philadelphia • Portland, Ore. • St. Louis • Montreal • Toronto*

USE THIS SPECIAL PROCESS FOAM RUBBER FOR LONGER-WEARING, MORE COMFORTABLE SEATS!

TEXFOAM is a new type foam rubber that will give automobile, bus, plane, train and boat seats greater comfort, better appearance and longer wear.

TEXFOAM is made by a process developed in our own research laboratories and used by no other foam rubber manufacturer. You will find it luxuriously soft and resilient. Squeeze it in your hand and see how quickly it springs back into shape. Examine its uniform cell structure with a magnifying glass. Blow a puff of smoke through it and check its porosity — how freely it breathes in use — how cool and comfortable an upholstery filler it is.

Whatever upholstery purpose you have in mind, it will profit you to write for samples and full information on *Texfoam* now. Our engineers are ready to work with you on your individual requirements. Sponge Rubber Products Co., 101 Derby Place, Shelton, Conn. Sales offices in principal industrial centers.

SEE HOW WARREN McARTHUR CORP. USES TEXFOAM!

Here's the way the Warren McArthur Corporation, New York, uses *Texfoam* in their Imperial Furniture. Model 3000AU illustrated.

The supporting aluminum straps are held to the frame by plated piano wire springs, secured to the chassis tubes through steel eyelets in the frame.

Over the springs and cemented to the frame is a canvas platform supporting the contoured *Texfoam* cushions.

The *Texfoam* seat and back are individual units, cemented to canvas and frame.

The easily removable tailored cover is in one piece, covering seat and back.

SRP

Trade-Marks Reg. U. S. Pat. Off.

SPONGE RUBBER PRODUCTS CO.

SPONGEX • CELL-TITE • TEXFOAM • TEXLITE • TEXLOCK

BUSINESS IN MOTION

To our Colleagues in American Business . . .

Perhaps it is because orders, particularly repeat orders, are definite proofs of satisfaction that comparatively few buyers take the trouble to give any other expression of their esteem. As a rule, some unexpected or special quality or service is required to draw forth compliments in writing. Hence Revere was exceptionally pleased to receive the following letter:

"As you may know, we have duplicate dies with several firms for reasons that are obvious. However, we recently ran an experimental time study on two batches of identical goods from your firm and from another source. The results will amaze you.

"We have found that for uniform quality and excellence of raw finish your extrusions stand head and shoulder above all other sources that we have had contact with since forming this corporation and with sources that the writer was familiar with before the war in the midwest.

"During the running of this study, we found that we could cut and color with a complex compound in a double pass on a pleated buff and produce a superior finish in a saving of up to one-half of the time it took us to produce a similar finish on the same item of the same alloy from another source.

"More important to us, however, was the fact that we find your materials to be much more consistent and that we do not find that 'batches' make the difference that they seem to with goods from other reputable sources.

"If this information and the technical data relating to it can ever be of value to you and your firm, please feel free to call upon us at any time."

This heart-warming letter assured us again that the infinite pains taken in our laboratories and mills to maintain standards and specifications are continuing to guarantee the customer satisfaction without which we could not have survived for 147 years.

However, our purpose in revealing this letter was not to pat ourselves on the back, but to point up what we have said so often in the past: that a successful relationship between buyer and seller depends upon a full interchange of information as to products and processes, successes as well as failures. No less than the compliment, the letter of complaint is also good business. A frank statement of the whys and wherefores of dissatisfaction supplies the information that makes corrective measures possible; without it, both parties may remain in the dark as to their real requirements and potentialities. Hence Revere suggests that no matter what you buy, nor from whom, brickbats are as essential as bouquets. Suppliers who know all the facts, good or bad, can always serve you better.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

☆ ☆ ☆

Executive Offices:

230 Park Avenue, New York 17, N. Y.

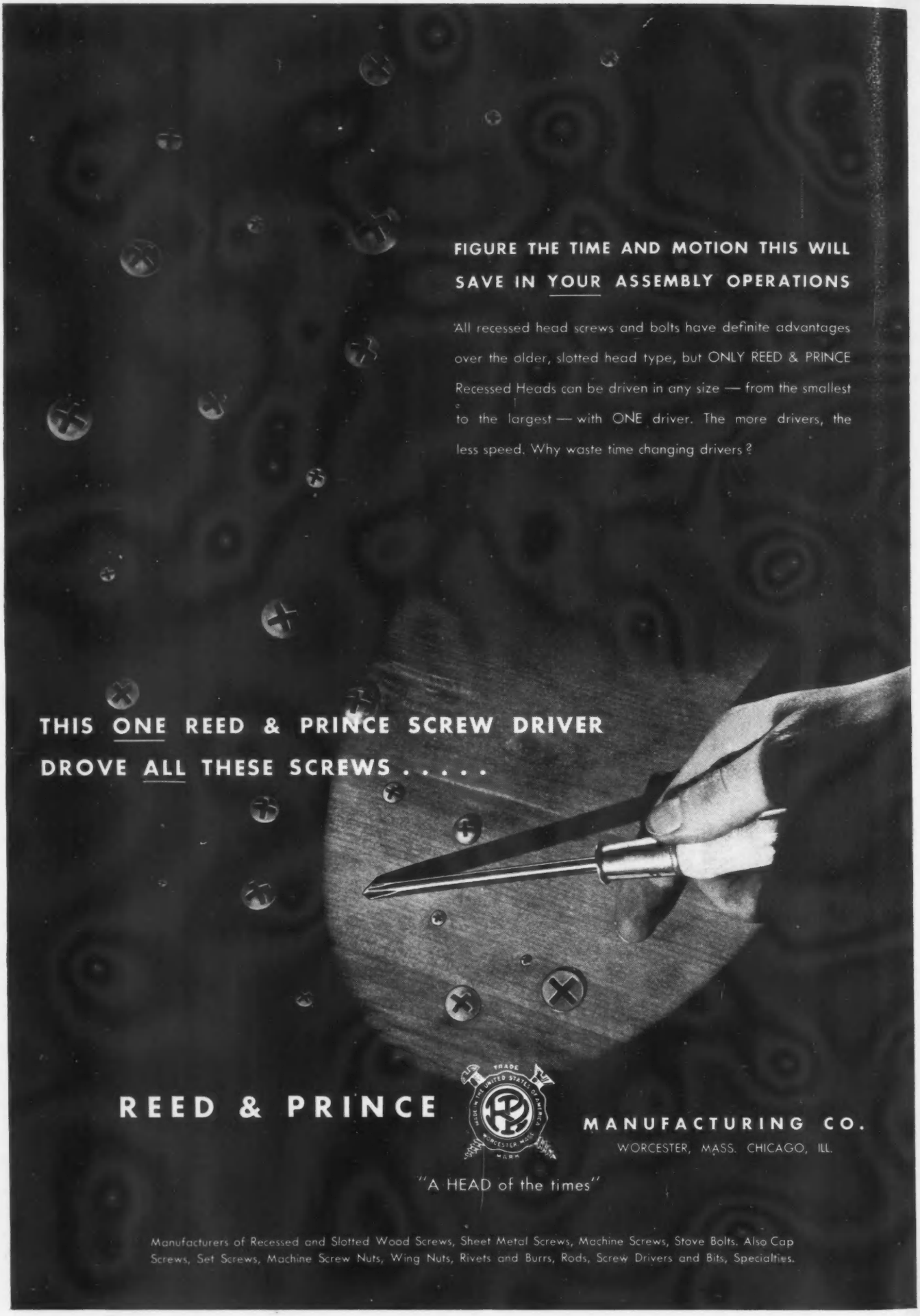


FIGURE THE TIME AND MOTION THIS WILL SAVE IN YOUR ASSEMBLY OPERATIONS
All recessed head screws and bolts have definite advantages over the older, slotted head type, but ONLY REED & PRINCE Recessed Heads can be driven in any size — from the smallest to the largest — with ONE driver. The more drivers, the less speed. Why waste time changing drivers?
THIS ONE REED & PRINCE SCREW DRIVER DROVE ALL THESE SCREWS . . . . .
REED & PRINCE
MANUFACTURING CO.
WORCESTER, MASS. CHICAGO, ILL.
"A HEAD of the times"
Manufacturers of Recessed and Slotted Wood Screws, Sheet Metal Screws, Machine Screws, Stove Bolts. Also Cap Screws, Set Screws, Machine Screw Nuts, Wing Nuts, Rivets and Burrs, Rods, Screw Drivers and Bits, Specialties.

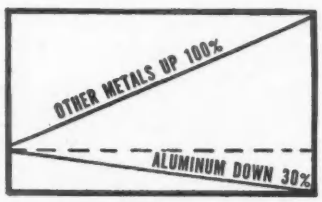
WHAT HAS THIS ALUMINUM BRACKET GOT TO DO WITH AUTOMOBILES?

HERE'S your answer in black and white. The original bracket made of cast iron is shown at right. On the left you see its counterpart extruded from Reynolds Aluminum. By every comparison, the aluminum extrusion wins in a walk.

This is how the score reads. Pound for pound aluminum provides nearly three times more metal to start with. Then economical extruding eliminates slower, more costly casting procedure and attendant scrap losses. The hole is extruded to closer tolerances and saves a major machining operation. Because aluminum is rust-proof, the bracket requires no paint or other protective coating. Weight advantage of aluminum over cast iron also reduces shipping costs. All totaled, this manufacturer (name on request) is getting a better product at a lower cost with aluminum.

Ease of working, light weight, faster handling, lower shipping costs, freedom from rust, attractive natural finish—these are aluminum's basic advantages. And you get them all in every Reynolds product—extrusions, structurals, screw machine stock, pipe, rod, sheet and tubing—in alloys and tempers to meet your requirements.

Investigate where and how aluminum can be fitted into your production picture profitably. It's easy—just call your local Reynolds Sales Office or write direct to Reynolds Metals Company, Aluminum Division, 2513 South Third Street, Louisville 1, Kentucky.



As a result of Reynolds' becoming a primary producer, the price of aluminum is now 30% below prewar levels.

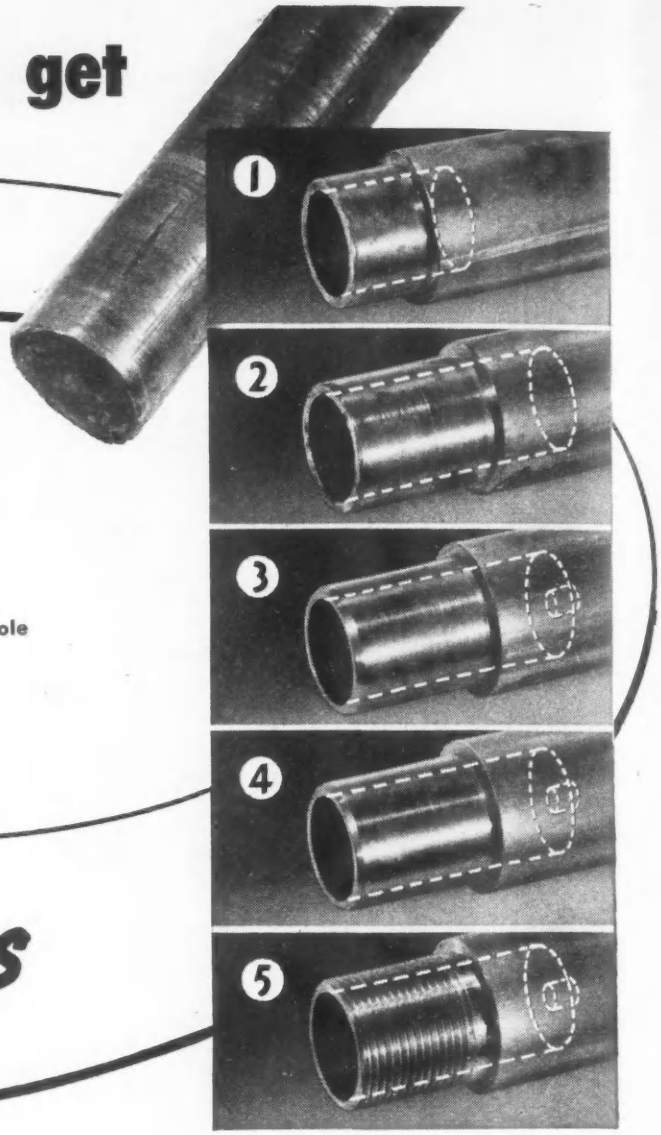
REYNOLDS METALS COMPANY, Aluminum Division, Louisville 1, Ky.

REYNOLDS *Lifetime* ALUMINUM

REYNOLDS' PIONEERING MADE ALUMINUM COMPETITIVE . . . TAKE ADVANTAGE OF IT!

How else could you get

FROM THIS



1 Start 1″ hole; rough-turn thread diameter part way
2 Finish 1″ hole; complete turning thread diameter
3 Drill ⅜″ hole; chamfer and face end
4 Finish-turn thread diameter; finish-form base of 1″ hole
5 Cut threads
6 Cut off finished plug

TO THIS

in only 14.7 seconds?

This lightning-arrester plug is formed from a length of S.A.E. 1020 steel bar stock in an automatic, six-stage operation—in less than a quarter of a minute! *Cycle-time used to be a minute and a half!*

This feat of modern machining was done with *all-Carboloy tooling.*

Only with carbide tools is such fast and trouble-free machining possible. For Carboloy Cemented Carbide is the *hardest metal made by man*—made to give you just such phenomenal service as this. And because of a continuous program of grade improvement, Carboloy's value to you is steadily increasing.

Take advantage of Carboloy engineers' experience with widely diversified carbide tooling jobs.

They'll be glad to work with your engineers in applying carbides to your machining operations, simple or complex.

They're ready to help at any time, whether your requirements call for any of Carboloy's 600 standard tools or blanks, or for special Carboloy tools available through more than 150 tool manufacturers.

For valuable assistance and the best in carbide tools —Carboloy Cemented Carbide—call in your Carboloy representative.

CARBOLOY COMPANY, INC., 11151 E. 8 Mile Ave., Detroit 32, Mich.

CARBOLOY® CEMENTED CARBIDE

AUTHORIZED CARBOLOY CEMENTED CARBIDES DISTRIBUTORS

Most sizes and styles of standards are stocked by authorized distributors in 82 cities from coast to coast.

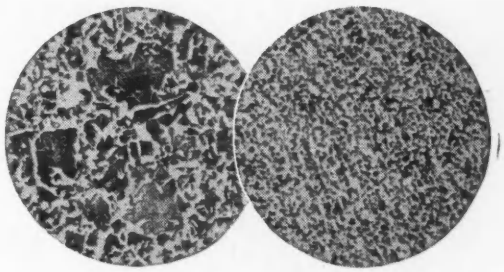
Send for Carboloy's 64-page Catalog GT-200. Keep it handy for maximum savings in carbide tooling.

YOU CAN DEPEND ON

VANADIUM

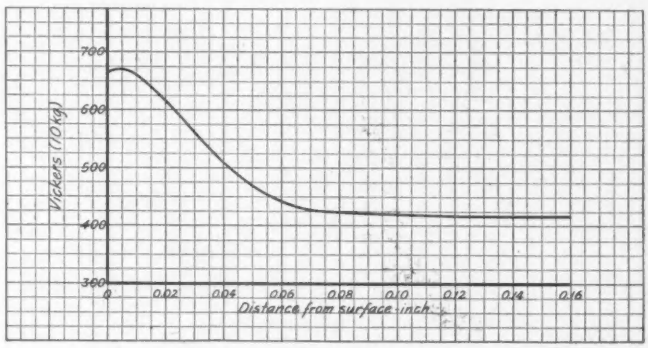
to give you grain size control, high performance, and ease of processing

GRAIN SIZE is refined by the addition of vanadium, the balance between strength and toughness is improved, and greater uniformity is promoted between transverse and longitudinal properties.



0.34 C 0.34 C, 0.20 V

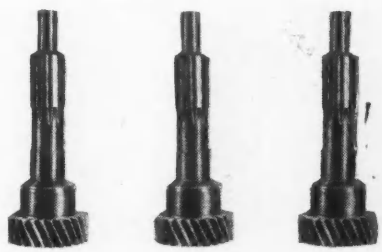
HIGH PERFORMANCE follows the use of vanadium in constructional steels. In carburized parts, for example, the well-integrated bonding between case and core, inherent in vanadium carburizing steels, assures excellent shock-resisting properties and maximum service life.



Hardness penetration graph of Chromium-Vanadium A 6120 steel, with a light case (0.80–0.85% carbon) in outer .010 inch

EASE OF PROCESSING—Uniformity of vanadium steels from heat to heat, with easy and uniform response to thermal and mechanical treatments, brings large compensation—savings far over-shadowing differences in initial materials costs.

Our metallurgists will be glad to assist you in the application of vanadium to meet your requirements.



MAKERS OF FERRO-ALLOYS VANCORAM CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

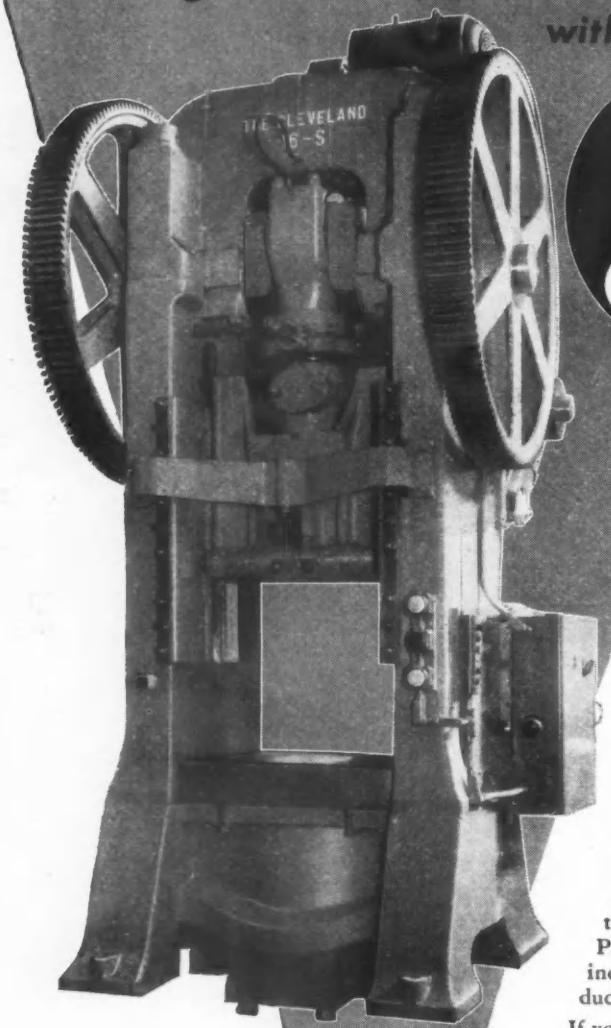
420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

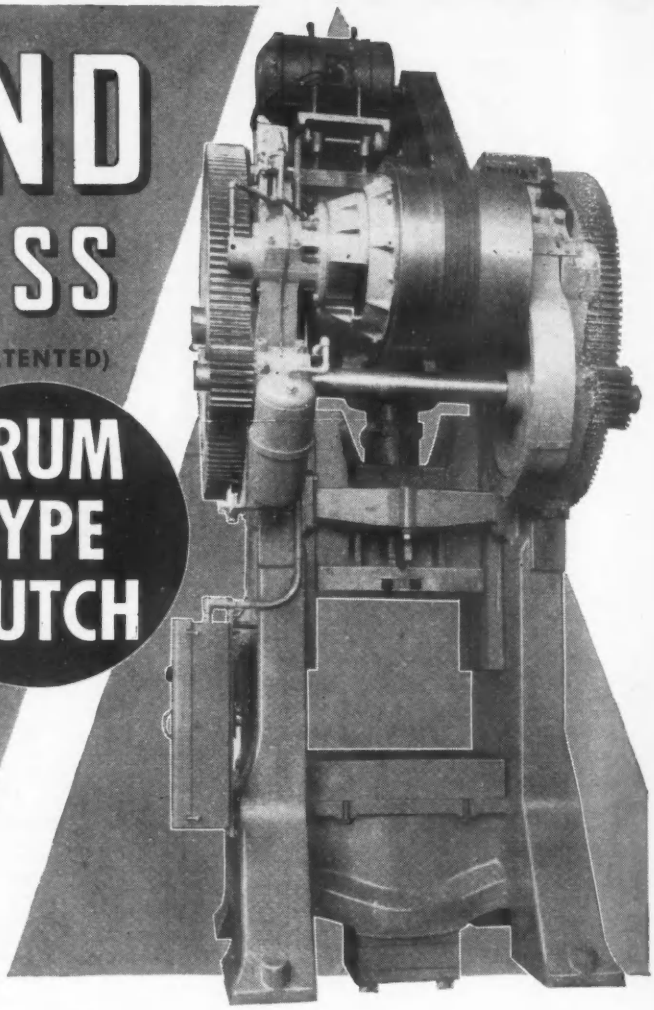
CLEVELAND

Single Crank PRESS

with (PATENTED)

DRUM TYPE CLUTCH

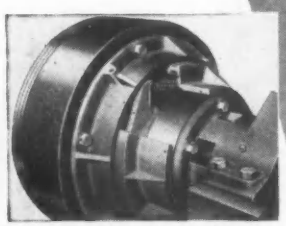




The above illustrations show a front and rear view of a Cleveland 16 S Straight Sided Single Crank Press, double geared, twin drive, equipped with the (patented) Cleveland Drum Type Air Friction Clutch with spring loaded Brake. The Press has a capacity of 250 tons.

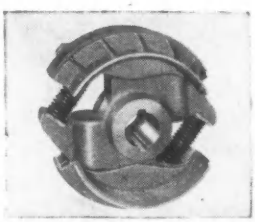
Like each of the twelve distinct types of the Cleveland line (which includes: Inclinable, Horning, Punch Type, Knuckle Joint, Trimming, Open Back Gap, Straight Sided Crank, Straight Sided Eccentric, Double Action Toggle, Single Point, Two Point and Four Point Presses), these two views show the rugged, compact construction of this Single Crank Press which assures long life and low upkeep. Furthermore, the features incorporated in its design provide faster, better and more accurate production without interruption.

If you are considering the installation of any type of Power Press, it will pay you to specify Clevelands equipped with the (patented) Air operated Drum Type Clutch.

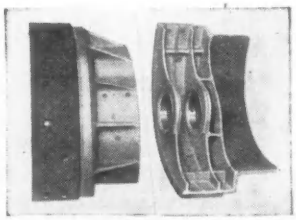


This illustration shows the Cleveland (patented) Drum Type Clutch mounted on the Press.

This illustrates the Clutch, with flywheel removed, and shows the air cylinders and the lever for operating the clutch part of the shoe.



This illustrates the brake and shows clearly the brake part of the shoe and the springs for operating the brake.



The Clutch and Brake is a combined unit of one-piece construction and cannot, therefore, become separated or engaged simultaneously.

CLEVELAND PUNCH & SHEAR WORKS CO.

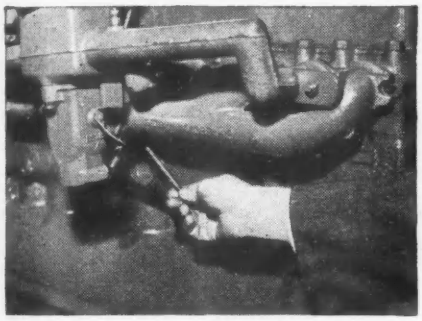
District Offices

NEW YORK · CHICAGO · DETROIT · PHILADELPHIA · PITTSBURGH

Cleveland, Ohio

INCONEL CHOKE TUBES SHOW THE WAY...
You get 3-way benefits when you use Inconel

High strength, even at red heat
Freedom from oxidation and corrosion
Longer service life



Inconel choke tubes are used by leading car manufacturers today. Made from welded tubing they are preferred because of their high resistance to heat and corrosion.

Here's the story of a search to uncover a metal that would stay strong at high temperatures... that would withstand destructive corrosives:

One after another, car manufacturers got fed up with choke tube failures. They started looking for a *tough* metal... a metal that would keep automatic choke tubes on the job *for the life of the engine.*

Choke tubes lead a hard life. *But that was no excuse for failure.* What car manufacturers demanded was a metal that would keep its strength at temperatures of 1125° to 1175° F... resist oxidation... fight the corrosive action of leaded fuels.

After repeated trials, foremost car manufacturers *independently* turned to INCONEL*, the 80 Nickel – 14 Chromium INCO Alloy. The result? INCONEL *choke tubes are now standard equipment on leading makes of cars.*

And that's not all!

INCONEL exhaust manifolds, pipes, and muffler interiors are making performance history, too. A large bus company reports that INCONEL muffler interiors have outlasted *by 4 times* any previous standard interior. And the INCONEL interiors are still in service! Moreover, in Pan American Clippers, INCONEL exhaust manifolds withstand 1500° red-heat temperatures; resist corrosive gases, continuous vibration, and sudden temperatures as well.

Remember this – you save time by considering INCONEL *first* when you have a problem that demands strength plus resistance to heat, corrosion, oxidation. INCO's Technical Service will be glad to help with your metal-selection problems. Write. There is no obligation.

EMBLEM OF SERVICE

INCO
TRADE MARK

INCONEL BRINGS YOU ALL THESE ADVANTAGES

* Extra strength at high temperatures.
* Oxidation resistance, even at red heat.
* Corrosion resistance, hardness, toughness.
* Good machinability, workability.
* Excellent spring properties.
* High fatigue strength.
* Rigidity.

THE INTERNATIONAL NICKEL COMPANY, INC. · **67 Wall Street, New York 5, N. Y.**

INCONEL*
... for long life at high temperatures

(80 NICKEL-14 CHROMIUM)

*Reg. U. S. Pat. Off.

Quality

COLD FINISHED STEEL *is* our TRADE MARK

High finish . . . accurate size . . . full section . . . stringent tolerance . . . and engineered to each application.

Quality Cold Finished Bar Steels of selected analyses . . . painstakingly produced for your requirements . . . are the symbol and trade-mark of Bliss & Laughlin production.

ALLOY, CARBON, SCREW STOCK, SPECIAL ANALYSIS STEELS

COLD FINISHED BAR STEELS AND SHAFTING

BLISS & LAUGHLIN, INC.

General offices: HARVEY, ILLINOIS

Plants: HARVEY, ILL. • BUFFALO, N. Y. • MANSFIELD, MASS.

SALES OFFICES IN ALL PRINCIPAL CITIES

UNION PACIFIC

The Governor of California invites You

State of California
GOVERNOR'S OFFICE
SACRAMENTO

EARL WARREN
GOVERNOR

To American Industry:

In California we are currently celebrating the centennial anniversaries of the beginnings of our State. We gain much inspiration from our review of the progress which has been made in the comparatively short span of one hundred years.

During the past eight and one-half years alone California's population has increased by 47 per cent and our industry and agriculture have risen to positions of great importance in the economic life of the nation.

Our tremendous reserves of natural resources and our strategic world trade position on the shores of the Pacific Basin assure California's continued progress in the years to come.

I am happy, therefore, to join in inviting you to investigate the opportunities for expansion which exist in the many communities of our State.

Sincerely,

Governor

Earl Warren

* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

Does Your Production Require FINISH GRINDING *of* CURVED SURFACES?

IF SO, INVEST IN THIS *New*

GEARGRIND UNIVERSAL OSCILLATING *Precision Grinder*

The rigidity and precision construction of this machine insure fine finish.

Typical PRODUCTION ITEMS

● It's versatile! It grinds external and internal cylindrical surfaces, generated or formed spherical external and internal surfaces, external conical surfaces, internal tapers, barrel shaped surfaces, annular ball bearing races and fillets.

We have prepared an illustrated folder showing set-ups for many types of work that you can do better and faster with this machine. A copy will be mailed you on request.

The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH., U.S.A.

IS

Steel Tubing

THE BOTTLENECK OF YOUR PRODUCTION SCHEDULE ?

NIKOH

offers new facilities for manufacturing high-quality, welded-steel tubing, pipe, electric conduit. (See next page.) If you can supply your own steel, we will fabricate to your specifications in any desired quantity. Nikoh Tube Co., 5001 S. Kedzie Ave., Chicago 32, Ill.

NIKOH

NIKOH products are fabricated with the latest type Yoder automatic machines... all orders carefully inspected and tested before shipment.

Nikoh Tubing meets all standard specifications for diameter, concentricity, wall thickness, and finish. Our efficient manufacturing and handling methods assure low production costs.

WELDED STEEL TUBING...

A smooth, uniform product of accurate size. Available in round, rectangular, and other regular and irregular sections. Outside diameters from ½" to 4".

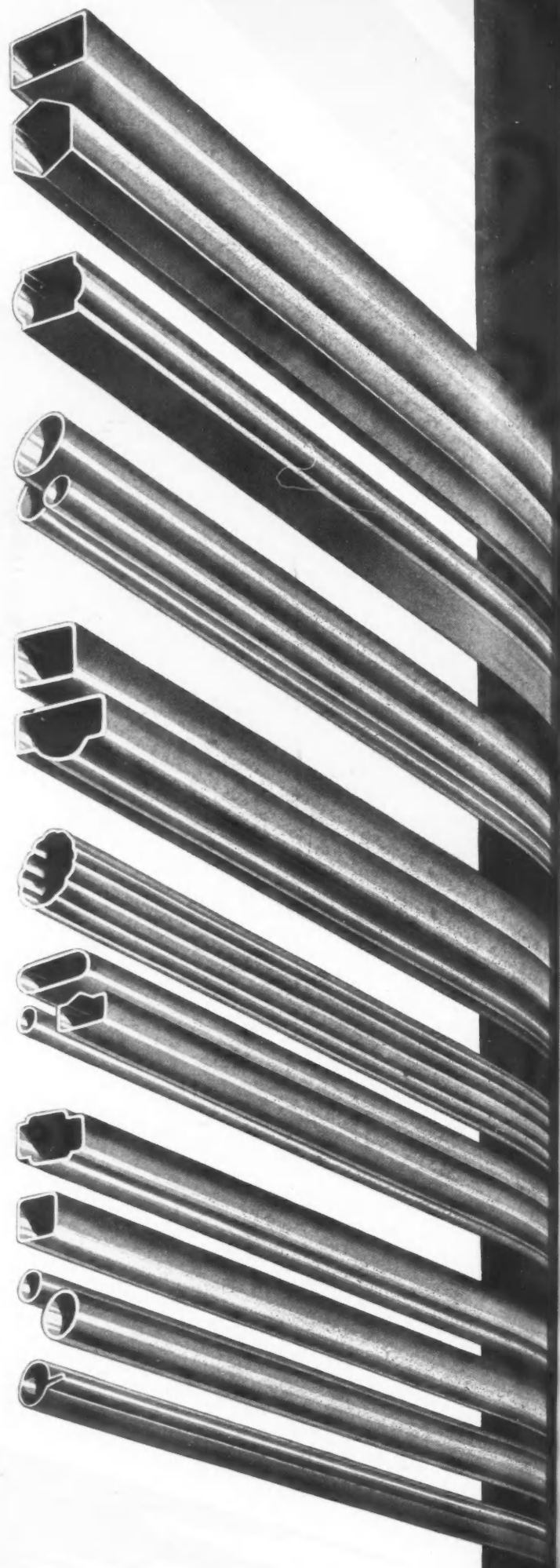
WELDED STEEL PIPE...

Available in all standard sizes from ¾" to 6"ID.

PLATED THIN WALL ELECTRIC CONDUIT...

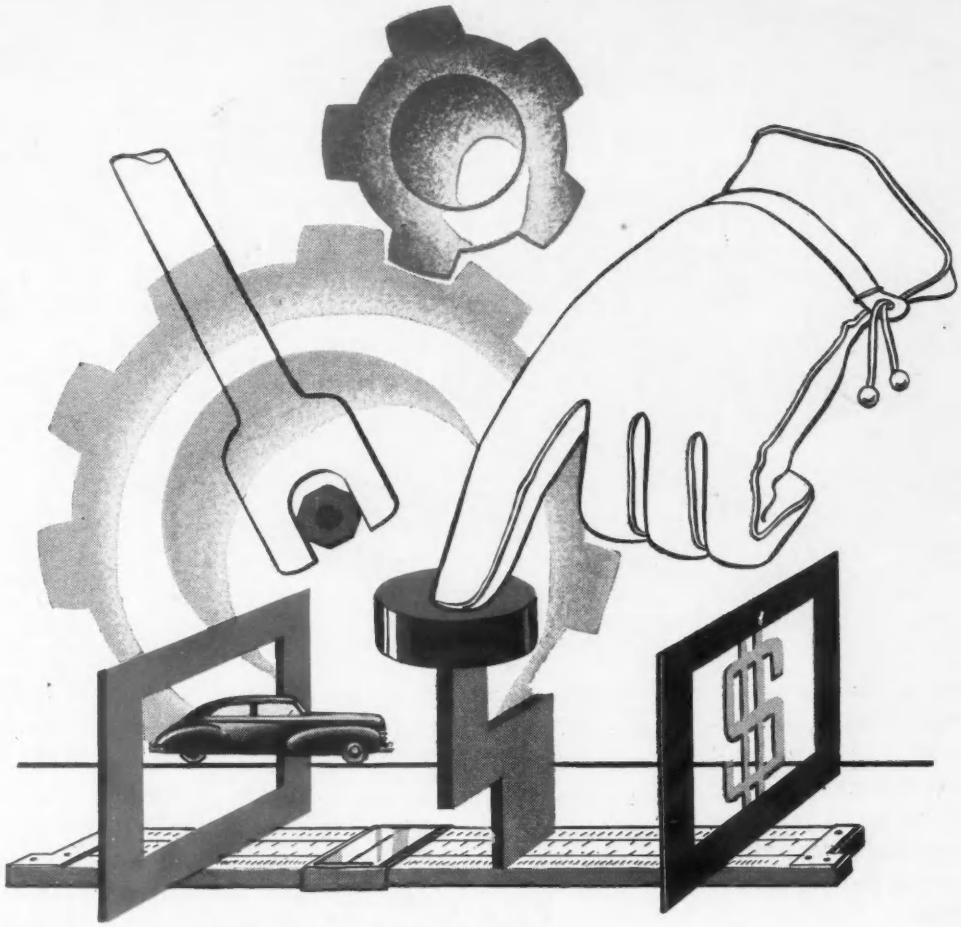
in standard sizes from ½" to 2".

Our plant has a potential output of several thousand tons per month, enabling us to give prompt service on the largest orders. We are especially interested to hear from manufacturers who can supply their own steel.



NIKOH TUBE COMPANY

5001 S. Kedzie Ave. • Chicago 32, Ill.



"KNOW HOW" RINGS UP SALES

The salability of a product is in direct ratio to how it compares with competitive products in its price range. A "good buy" is the result of "know-how," and sometimes it is profitable to go afield for specialized "know-how" such as AC offers to its equipment customers.

If you have an equipment* problem, you are cordially invited to investigate AC's wide variety of standard or special equipment units, backed by 39 years of "know-how." They can help you ring up extra sales.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

General Motors Bldg.
Detroit 2, Michigan

Mott Foundation Bldg.
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73 E. Wacker Drive
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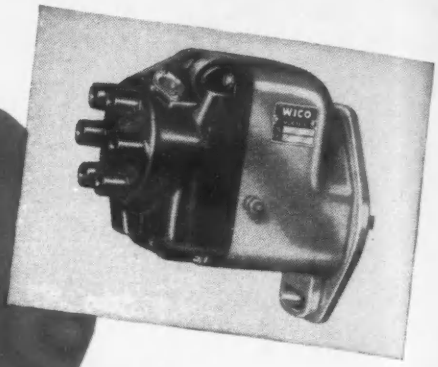
And now here's WICO'S new SIX CYLINDER MAGNETO The XHG-6



Safety Cap

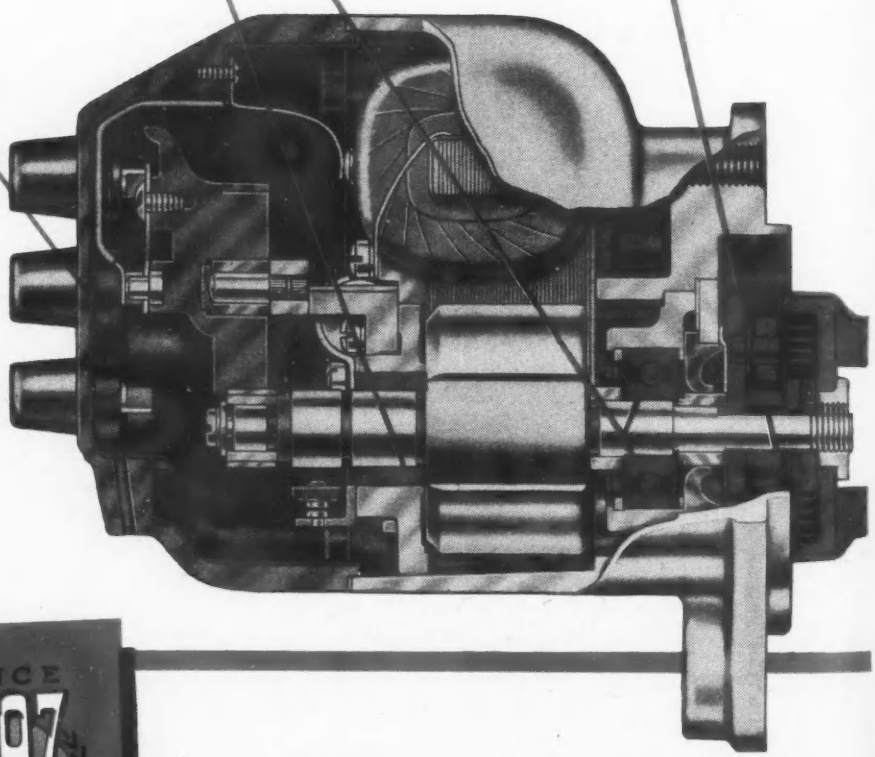
Bearings

Impulse Coupling

THE XHG-6 is the latest of a proved series of tough, dependable, Wico Model X magnetos built to operate under the most adverse conditions. For industrial, pumping and heavy farm equipment there is no finer six-cylinder, flange-mounted magneto.

Exhaustive bench and field testing of the XHG-6 proves that a big, oversize magneto is not necessary for either long life or adequate spark output. Only 6 1/16" long, weighing but six pounds, this XHG-6 will perform with other magnetos three times its size. Its spark output at engine starting speeds is 15 kilovolts (average engine requirements 7 KV), and its running output, at 1800 RPM is 19 kilovolts (average engine requirements 8 KV). At higher speeds the spark output exceeds 20 KV.

This entirely new six-cylinder magneto has a large distributor cap with plenty of space between the terminals. This eliminates jump-over across insulating surfaces in wet or humid weather. The bearings, one ball and one sleeve type, are impregnated with oil for life. Engine oil is sealed out of the magneto by an effective oil seal and slinger. The trouble-free impulse coupling is the finest made; time-tested for more than twelve years on WICOs, this impulse coupling will take a tremendous beating.



SINCE 1897
WICO
DEPENDABLE IGNITION

Trained field engineers and over 2,000 authorized service stations serve WICO users everywhere. Wico Electric Company, West Springfield, Massachusetts, world's largest manufacturer of magnetos exclusively.

Now...BETTER TUBING AT LOWER COST

. . . for brake, fuel, oil, and vacuum lines

For new equipment or replacement—get Alcoa 4S Annealed Aluminum Tubing!

EASY TO WORK—strong Alcoa 4S Annealed Aluminum Tubing is easy to cut, easy to flare, easy to bend smoothly. No special jigs required.

LOW COST—because aluminum is lighter than most other common metals, you get three times as many feet of Alcoa Tubing per pound. To get the real cost of Alcoa Tubing, divide your purchase price by three!

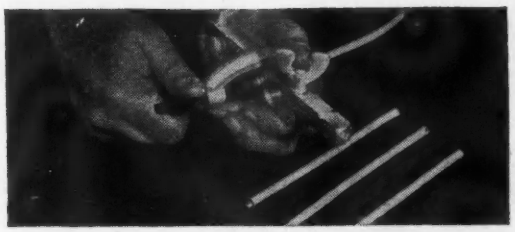
NON-SLUDGING—won't form sludge in lubricating oils or gum in gasoline—gives better engine protection and performance.

HIGH ENDURANCE LIMIT—withstands fatigue, assures long life under vibration.

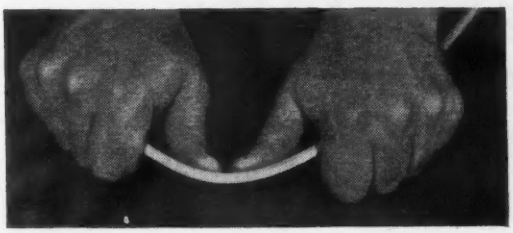
PRODUCED IN ALL SIZES commonly used for fuel, oil, brake, and vacuum lines.

Call your nearby Alcoa sales representative or write ALUMINUM COMPANY OF AMERICA, 2110 Gulf Building, Pittsburgh 19, Pennsylvania.

DON'T ACCEPT AN INFERIOR ALUMINUM TUBING! Alcoa 4S Annealed Aluminum Tubing is tough, resistant to fatigue, especially suited to withstand vibration in motor vehicle applications. Specify *Alcoa* 4S Annealed Tubing!



EASY TO WORK—Alcoa Tubing can be flared easily with standard tools.



TAKES SMOOTH BENDS—without collapsing —no special equipment needed.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM 1888 1948 60 YEARS OF SERVICE

the best brake is AIR

Payloads are more *profitable* with Air Brakes, as proved by thousands of vehicle operators. Air Brakes cut down costly slow-downs—stops are quicker, surer, and schedules speeded up. Drivers can safely drive longer runs, since fatigue is materially lessened. And what's more, *Bendix-Westinghouse* Air Brakes pay for themselves in lowered service costs! Follow the swing to Air Brakes—the world's safest power to stop!

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY, ELYRIA, OHIO

BENDIX-WESTINGHOUSE
GENUINE
AIR BRAKES
TRADE MARK REGISTERED

the best AIR brake is

Bendix-Westinghouse

ELECTRO-

DYNAMATIC

MAGNETIC

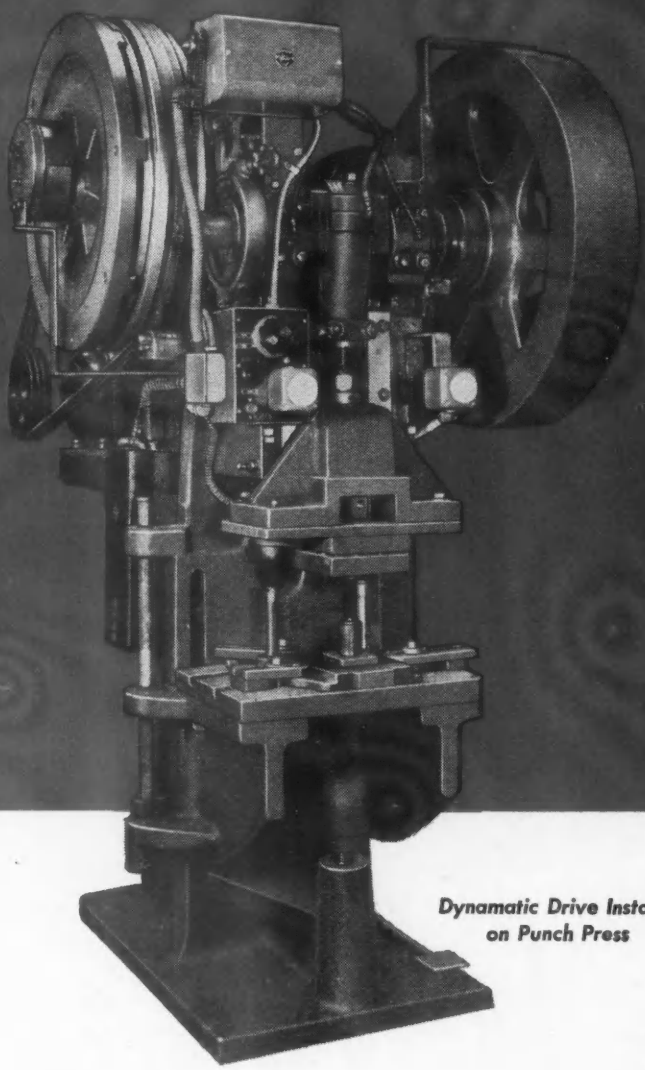
DRIVES, BRAKES, POWER COUPLINGS AND OTHER DEVICES

★ Variable Speed from Constant Speed Source

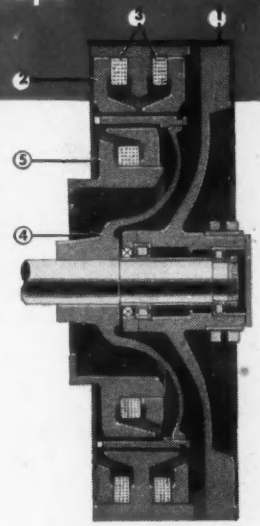
★ Constant Speed from Variable Speed Source

★ Smooth, Full-Torque Starts

★ Cushioned Stops



Dynamatic Drive Installed on Punch Press



1. Flywheel 2. Main Field 3. Coils 4. Rotor 5. Brake Field

Dynamatic devices can be applied to any shaft in any type of machine to transmit motion from one rotating member to another without mechanical contact, without friction, without shock, and under complete control.

Utilized as a variable speed drive, power coupling, slipping clutch, or brake, the Dynamatic principle has a wide range of applications in many industries. It furnishes a simple, compact, frictionless means of power application which is under instantly responsive control. Sizes range from the tension control on a non-backlash casting reel to an 18,000 horsepower drive for a wind-tunnel blower. Inquiries are invited.

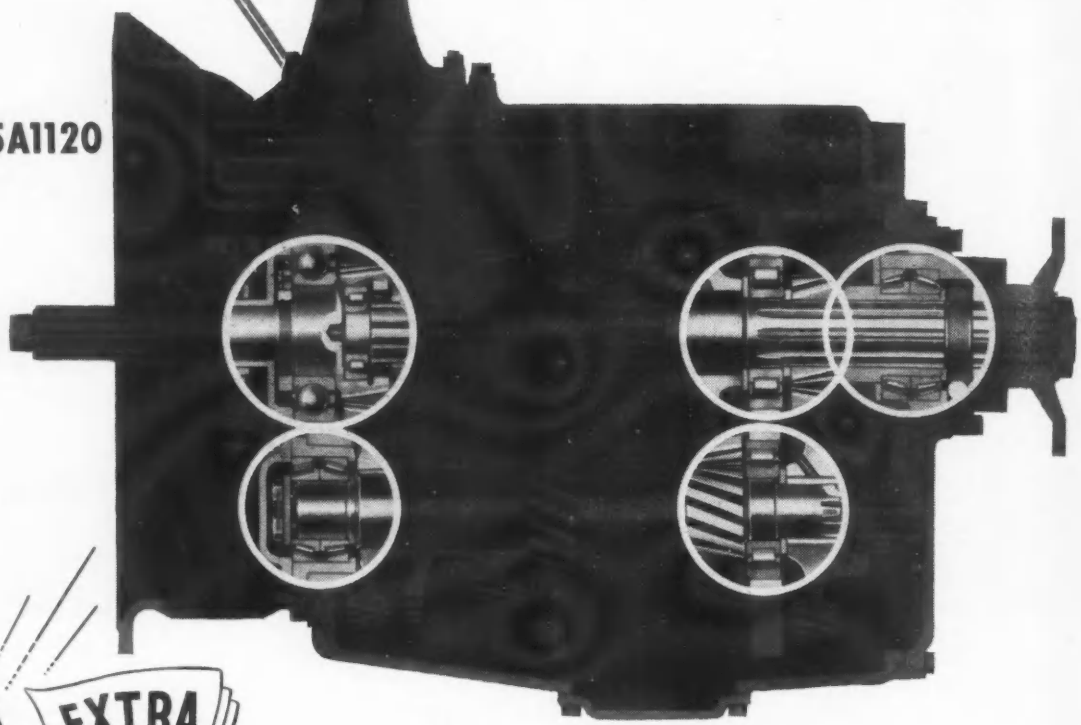
Basically, Dynamatic devices consist of two rotors, one operating inside of, but not touching the other. One of the rotors is an electro-magnet. Either rotor may be connected to the driving or the driven member. Direct current field coils located in one rotor produce eddy currents in the second rotor, exerting pull on the first. Slippage between the rotors is controlled by varying the current applied to the field.

DYNAMATIC CORPORATION • KENOSHA, WISCONSIN

Subsidiary of EATON MANUFACTURING COMPANY Cleveland, Ohio

See a cutaway,
activated version of Model 5A1120 at the 1948 Road Show. Booth 1224.

Model 5A1120



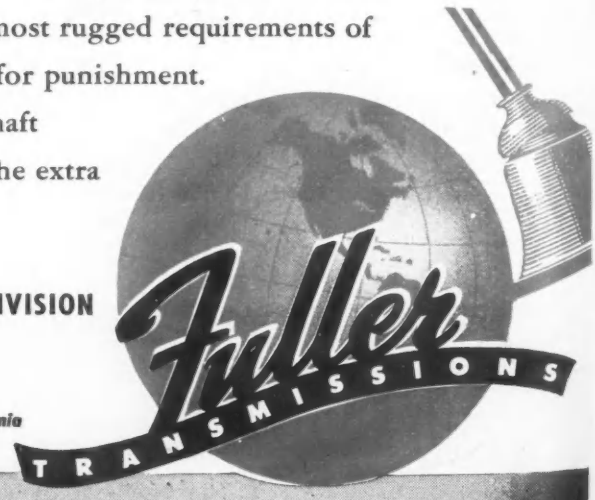
Extra-Heavy Bearings

for extra-heavy service

Model 5A1120—Fuller Manufacturing Company's newest transmission—is built for engines up to 1120 cu. in.

Extra-heavy bearings enable it to meet the most rugged requirements of heavy-duty service . . . make it a veritable glutton for punishment.

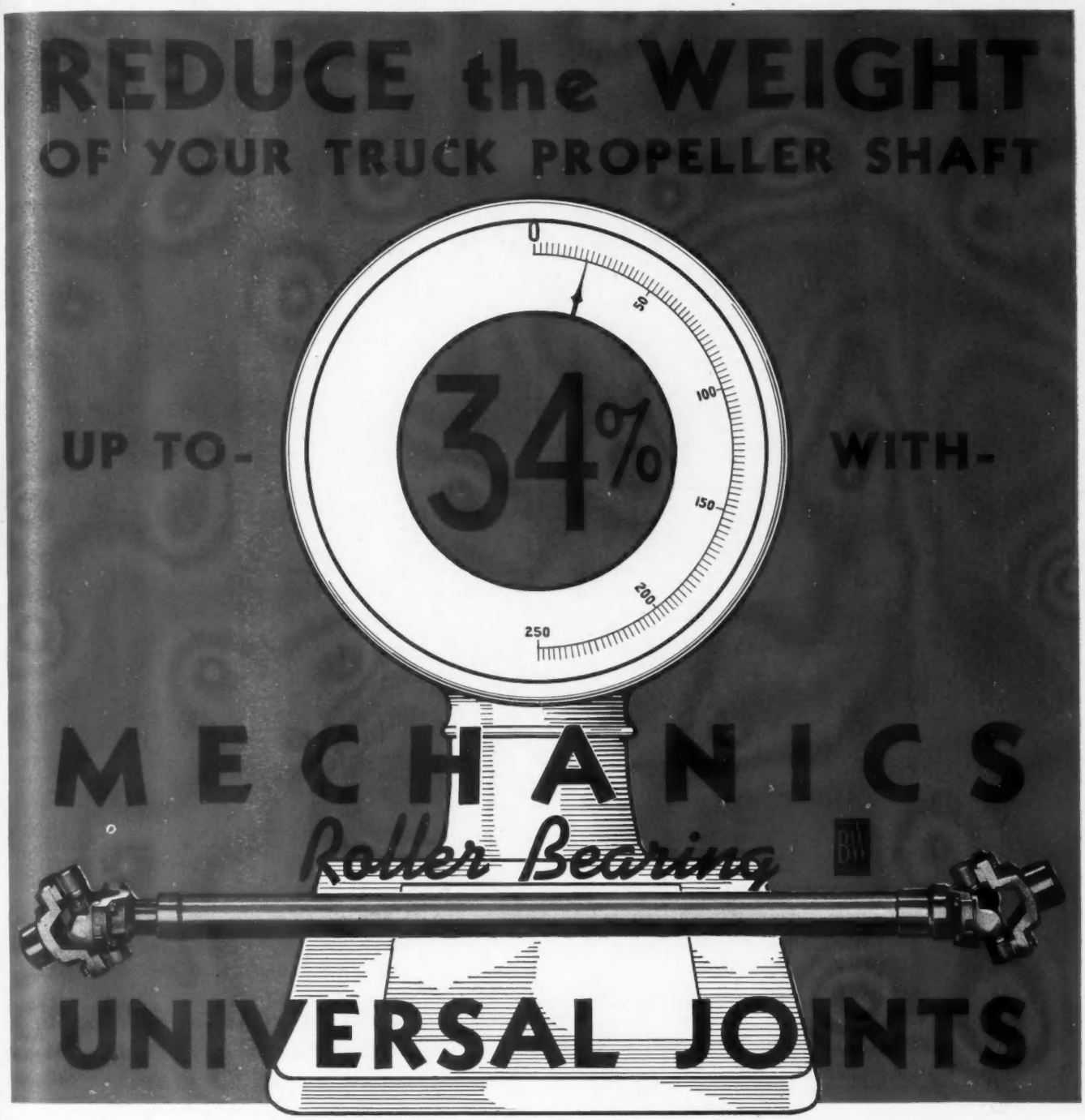
Maximum-capacity bearings on both the mainshaft and countershaft give Fuller Model 5A1120 the extra stamina that means extra service from your truck.



FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION
KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wisconsin
Western District Office (Both Divisions): 1060 East 11th Street, Oakland 6, California

REDUCE the WEIGHT
OF YOUR TRUCK PROPELLER SHAFT



MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFTS are made 34% lighter in weight than any others now in use — without loss of torque capacity. They are stronger than shafts that are half again heavier. MECHANICS 34% lighter UNIVERSAL JOINTS PROPELLER SHAFTS run smoother and place much less load on transmission and pinion bearings. Their fitting yokes are machined all over.

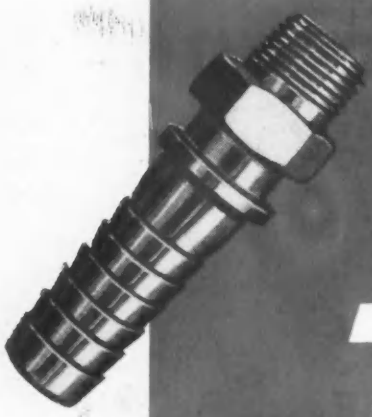
Why haul unnecessary "dead-head" poundage that reduces the "pay-load" part of the legal gross weight allowed for your truck? With weight-saving design worth $1.00 per pound, per year, you can't afford to handicap *your* truck by making it haul useless, non-profit-earning-weight hundreds of thousands of miles.

For the designer who wants to add to the ton-mile capacity of his truck—without increasing its gross weight — our engineers will be glad to help specify a weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT application.

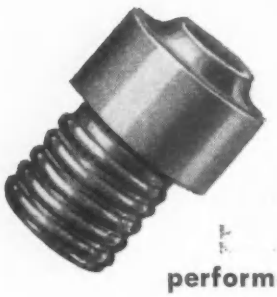
MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Ave., Rockford, Ill.

You can make parts like these on automatics—



AT A CUTTING OIL COST OF ONLY 7¢ A GALLON!



What! A cutting fluid for only 7 cents a gallon?

Yes, sir: Antisep All-Purpose Base, the best coolant you can buy for any money, giving top performance from every angle—finish, tool life, operators' satisfaction, etc.

It's a cutting base combining all the necessary film strength, lubricity and anti-welding properties you can get in any oil. You mix it with WATER, and use the solution at 15-to-1 to 30-to-1 in automatic screw machines. Here are its proven advantages:

1. Economy—water costs less than oil.
2. Safety—no danger to machine bearings, for water solutions have high film strength.
3. Cool work—pieces not too hot for operators or inspectors to handle. No blueing.
4. Antiseptic treatment provides freedom from rancidity; kind to every skin it touches.

This base, high in fatty oil, will handle 90% or more of all your machining or drawing operations. Get the whole story from E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton's new

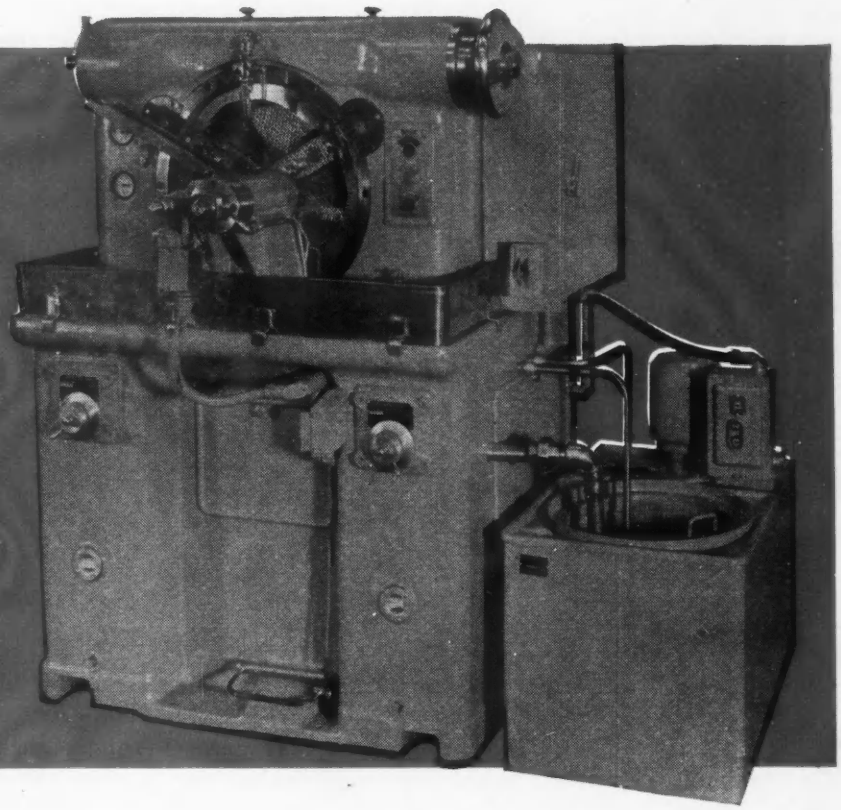
ANTISEP

All-purpose Base

WANT CLOSE-FIT THREADS...*FAST?*

then you want

THE NAMCO TRIPLE ROLL HYDRAULIC THREAD and FORM ROLLING MACHINE with Magazine Feed and Hydraulic Loader



This new precision high-production machine is the perfect answer for shops that have a large volume of long and short thread work requiring up to class 4 fit and unsurpassed finish.

Operating on the feed-through principle, with interchangeable two-roll or three-roll heads, the Namco Thread-Roller regularly produces smoother, more accurate work than ground threads. Capacities range from $\frac{3}{8}''$ up to $1\frac{1}{2}''$ using three rolls—and $\frac{1}{8}''$ to $\frac{9}{16}''$ using two rolls. Because of three-roll operation and three-point support which eliminates distortion, the machine is a "natural" for hollow work.

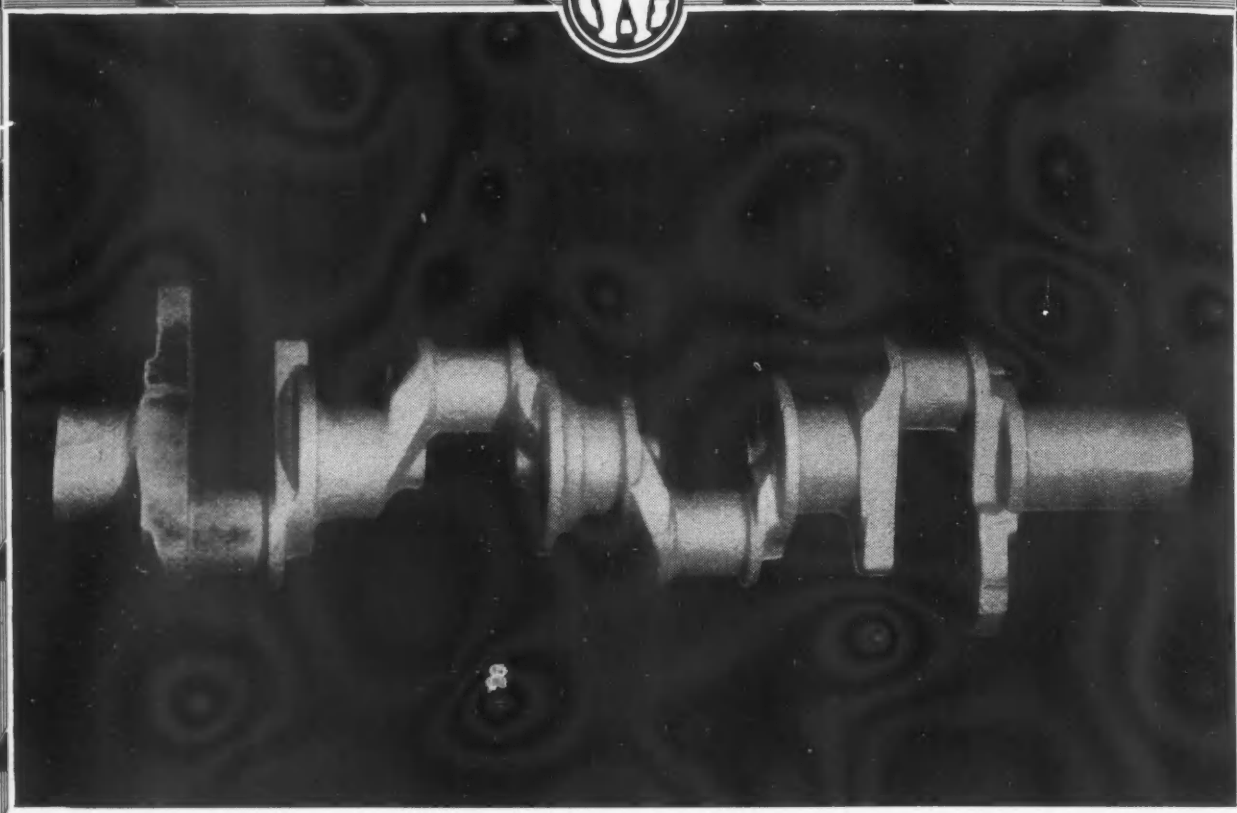
With the addition of magazine feed and hydraulic loader, just announced, the Namco Thread Roller becomes the fastest, most versatile, *most accurate* means for threading and form rolling, solid or hollow work to close tolerances with fine finish. Send us samples of the jobs you do; we'll do the rest—in quoting you on your requirements.

Complete details on the Namco Thread Roller are contained in this new eight-page bulletin. Ask us for TR 47.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing



Crankshaft forging for the most powerful piston-type aircraft engine in production in the world.

Wyman-Gordon produces more crankshaft forgings for aircraft, automobiles, trucks, and tractors than any other forging manufacturer.

Wyman-Gordon—Crankshaft specialists since the beginning of the internal combustion engine.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - - DETROIT, MICHIGAN

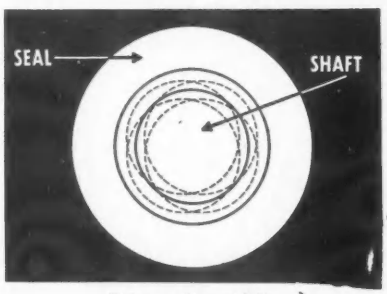
NATIONAL OIL SEAL LOGBOOK

OIL SEALING WHEN ECCENTRICITY, WHIP AND RUN-OUT ARE SEVERE

Shaft eccentricity, mis-alignment, momentary whip and end play are conditions present in varying degrees wherever shafts turn. These conditions create basic oil sealing problems. But proper oil seal design can and does solve these problems and protect the bearings. Usually, when these conditions are severe, specially-designed spring-loaded oil seals are indicated.

ECCENTRICITY

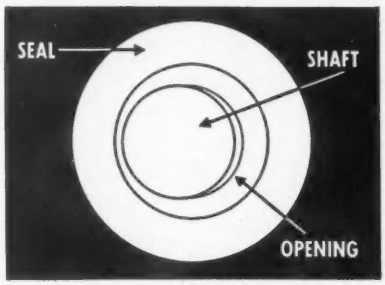
Tests with National Oil Seals over a period of years have indicated that properly designed synthetic-rubber seals, with correct spring-tensioning, will operate efficiently despite eccentricities reaching .030 indicator at 4000 RPM. Here it is most important that flexibility of the sealing member be balanced exactingly with the proper spring tensioning. However, both life expectancy and degree of sealing suffer proportionately with the rise in eccentricity. The lower the eccentricity indicator reading, the longer the life and the better the sealing.



Extreme Eccentricity

MIS-ALIGNMENT

Actual mis-alignment of meeting parts in a design has a slightly different effect on oil seals than eccentricity. Here utmost flexibility of the sealing member is essential, and again, special designs are recommended. Good sealing has been achieved on long test runs where mis-alignments are as high as .035. But surrounding conditions should be the best possible, and the seal so designed that it may operate efficiently in an off-center position.



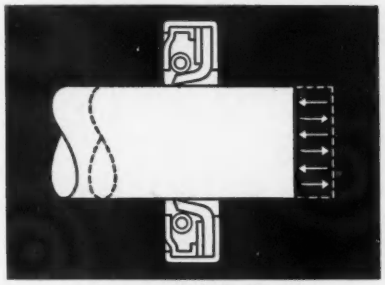
Extreme Mis-alignment

MOMENTARY WHIP

The momentary whip or mis-alignment which occurs in flexible crank or drive shafts presents still another oil seal problem. Highly-flexible oil seals, capable of efficient operation despite extreme *steady* eccentricity or mis-alignment, sometimes allow seepage under severe momentary whip conditions. Special oil seal designs using heavier spring tensioning are indicated; but if tensioning is not precisely correct for the job, seal life will suffer.

SHAFT END PLAY

Shaft end play can be compensated for in the oil seal design by stiffening the seal to avoid buckling the flange, and adjusting spring tension to overcome seepage during end-play movements. Here again, a special design of spring-loaded seal is recommended for maximum oil sealing efficiency.



Extreme Shaft End Play

In all the above cases greater oil seal life and performance will result when conditions are held within the following limitations:

Eccentricity (run-out) . . . . Not over .005
Mis-alignment . . . . . .005 to .010
Shaft End Play (thrust) . . . Not over $\frac{1}{32}$"

Severe momentary whip can often be modified by placing oil seals close to bearings; using sufficient section in the shaftings, and increasing number of bearings employed.

Any and all of these problems are being met by National Oil Seals now in regular service. National Oil Seal Engineers will gladly assist in your oil sealing problem; and design special seals if such are indicated. Your inquiry is invited.

NATIONAL
OIL AND FLUID SEALS ®

NATIONAL MOTOR BEARING CO., INC.

General Offices: Redwood City, California
Plants: Redwood City and Los Angeles, California; Van Wert, Ohio

CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

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CLEVELAND: 210 Heights Rockefeller Building, Yellowstone 2720. **DALLAS:** 30½ Highland Park Village, Justin 8-8453.
DETROIT: Room 1026 Fisher Building, Trinity 1-6363. **HOUSTON:** 6731 Harrisburg Boulevard, Wayside 3-1246.
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REDWOOD CITY, CALIF.: Broadway and National, Emerson 6-3861. **SPRINGFIELD 3, MASSACHUSETTS:** 124 State Street, Springfield 2-1881.
WICHITA: 340 North St. Francis Street, Wichita 2-6971.

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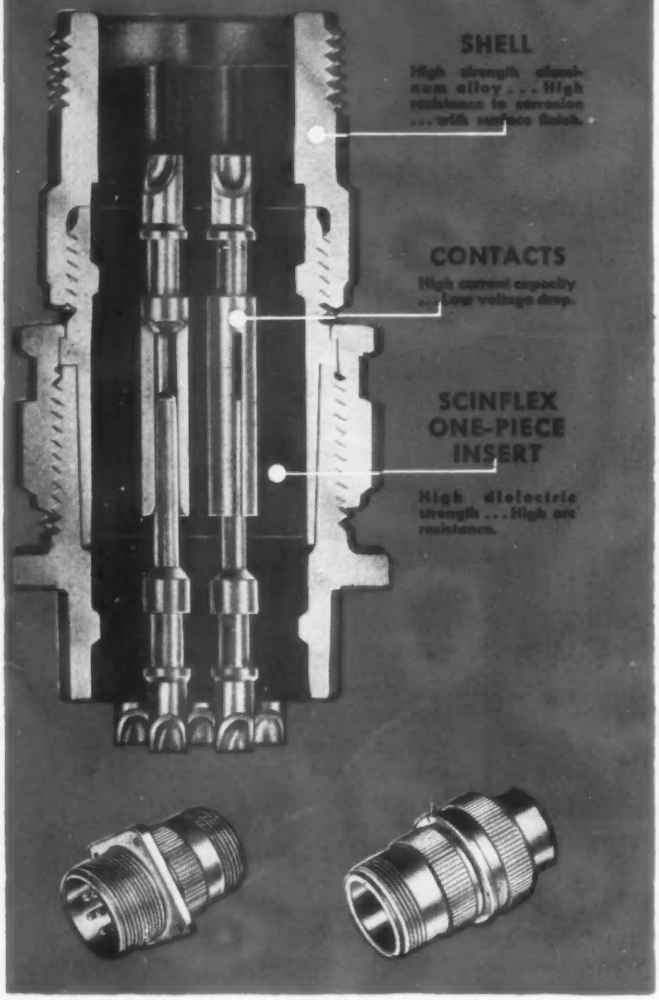
the finest ELECTRICAL CONNECTORS money can build or buy!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High strength aluminum alloy . . . High resistance to corrosion . . . with surface finish.
CONTACTS
High current capacity . . . Low voltage drop.
SCINFLEX ONE-PIECE INSERT
High dielectric strength . . . High arc resistance.

AND THE SECRET IS SCINFLEX!

Bendix-Scintilla* Electrical Connectors are precision-built to render peak efficiency day-in and day-out even under difficult operating conditions. The use of "Scinflex" dielectric material, a new Bendix-Scintilla development of outstanding stability, makes them vibration-proof, moisture-proof, pressure-tight, and increases flashover and creepage distances. In temperature extremes, from —67° F. to +300° F., performance is remarkable. Dielectric strength is never less than 300 volts per mil.

The contacts, made of the finest materials, carry maximum currents with the lowest voltage drop known to the industry. Bendix-Scintilla Connectors have fewer parts than any other connector on the market—an exclusive feature that means lower maintenance cost and better performance.

*REG. U.S. PAT. OFF.

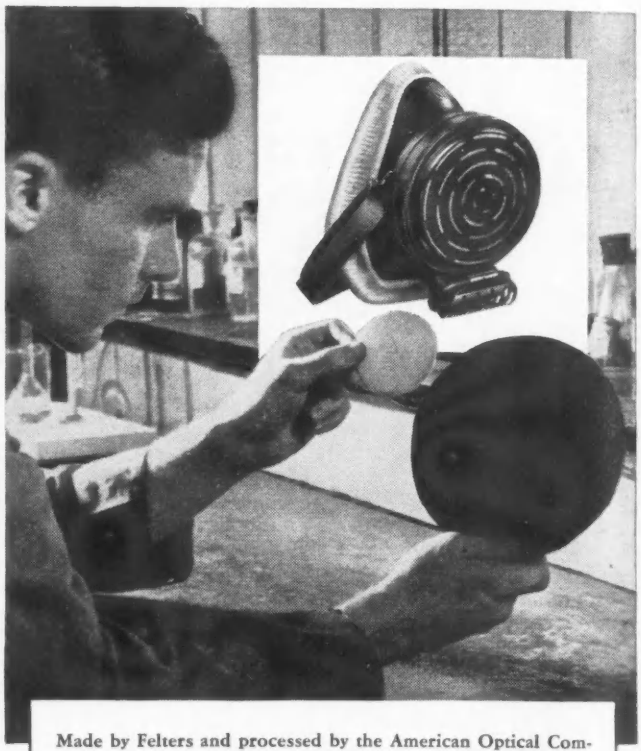
Write our Sales Department for detailed information.

• Moisture-proof, Pressure-tight • Radio Quiet • Single-piece Inserts • Vibration-proof • Light Weight • High Arc Resistance • Easy Assembly and Disassembly • Less parts than any other Connector

Available in all Standard A.N. Contact Configurations

BENDIX SCINTILLA — SCINTILLA MAGNETO DIVISION OF SIDNEY, N. Y. — AVIATION CORPORATION

HOW FELTERS FELT Guards Workers' Health in Dusty Jobs



Made by Felters and processed by the American Optical Company, the felt filter (left) used in the AO R-2000 Respirator is as efficient as an untreated filter (right) eight times larger. Felt for this vital job naturally had to meet strict requirements. Felters material met all specifications for resistance, porosity, abrasion resistance and composition. Developed over a period through mutual cooperation between Felters and the American Optical Company, felt for this particular use is supplied by us exclusively to AO.

Here's another example of an outstanding name in industry getting a special felt from Felters to do an important job.

Watch for future advertisements on Felters Felt used in large air filtering, dust collecting and air conditioning systems. Watch, too, for examples of the many uses for cut felt parts.

Whatever your felt needs be — by the roll, strip or square yard . . . felts for special or general purposes . . . or special precision cut felt parts — we are geared to fill your order promptly and accurately. Cut parts, for instance, are so precisely cut to your exact size and shape specifications, they can usually be installed after a simple grinding operation. Write for Felters Precision Cut Felt Parts Manual . . . today.

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210-R SOUTH STREET, BOSTON 11, MASSACHUSETTS

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Makes the Felt for the Parts it Cuts

Rubber-and-metal sandwiches made to order for America's Finest Cars

Originally the primary purpose of bonding rubber to metal was to reduce noise and transmitted vibration. U. S. Rubber Engineers, privileged to work with Automotive Engineers in pioneering this technique, have developed their work far ahead of the original purpose. Today for example, U. S. can bond rubber to metal so as to reduce stresses in metal parts, simplify designs, provide improved springing and prolong life of mechanisms.

An ideal setup for working out your problems is the new modern *United States Rubber Company plant at Fort Wayne, Indiana*, devoted to Engineered Rubber Products for the Automotive Industry.

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ENGINEERED RUBBER PRODUCTS FOR THE AUTOMOTIVE INDUSTRY

ENGINE COOLING

Radiators

FOR

Motor Trucks, Tractors, Combines, Industrial Trucks, Compressors, Locomotives, Power Plants, and Other Equipment.

ALSO

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GENERAL CONTROLS . . .
THE ACKNOWLEDGED STANDARD IN AUTOMATIC PRESSURE, TEMPERATURE AND FLOW CONTROL UNITS
Here are a few of an outstanding line of controls for Industrial, Commercial and Domestic applications.
★ALL GAS CONTROLS
★AIRCRAFT CONTROLS, ELECTRIC
★AUTOMATIC SAFETY PILOTS
★GAS REGULATORS
★LOW WATER CONTROLS
★GOVERNOR TYPE VALVES
★HI-LOW OFF VALVES
★INDUSTRIAL VALVES
★LOW PRESSURE GAS VALVES
★MOTOR OPERATED VALVES
★MAGNETIC GAS VALVES
★PILOT BURNERS
★PILOT GENERATORS
★REFRIGERATION VALVES
★SOLENOID VALVES
★STRAINERS—RELAYS
★100% SHUT-OFF VALVES
★THERMOSTATIC CONTROLS
★TRANSFORMERS—SWITCHES
★THERMOPILOTS
Controls for air, water, steam, natural, manufactured and liquefied petroleum gases, light and heavy oils, etc., refrigerants such as: freon, methyl chloride, sulphur dioxide and ammonia.
A. C. or D.C., normally closed or open type. High and low pressures and temperatures. PROVED AND IMPROVED PERFORMANCE IS PROOF THAT YOU CAN'T BUY BETTER CONTROLS.
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in the private offices and in all corners of automotive and aviation industrial manufacturing plants, influence the buying of materials, tools, machinery and equipment.

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reaches men whose names you'll never know—but whose recommendations may mean millions to you.

Also Automotive Industries helps to create and maintain the good reputation of your product in quarters where that help will do the most good.

•

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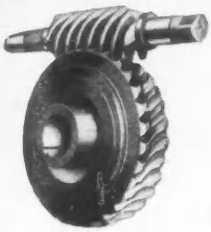
POWER TRANSMISSION EQUIPMENT

Brad Foote Gears



WORMS — Milled up to 12" dia. — up to 1 D.P.

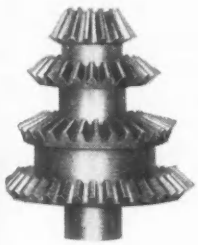
WORM GEARS — Generated up to 108" dia. — up to 1 D.P.

HERRINGBONE GEARS — up to 60" P.D. 18" face, 2 D.P.

STRAIGHT BEVEL GEARS — Straight tooth — up to 60" dia., 10" face up to 4½" C.P.

HELICAL OR SPIRAL GEARS — Generated up to 108" dia., 16" face — up to 1 D.P.

SPIRAL BEVEL GEARS — up to 32" dia., 6" face, up to 1½ D.P.

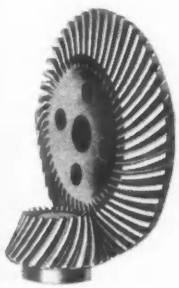


HELICAL GEARS — Ground tooth up to 14" dia., 6" face, 2 D.P.

SPUR OR HELICAL GEARS — Shaved tooth up to 20" dia., 8" face, 2 D.P.

SPUR GEARS — Form Cut—to 96" dia., 24" face — up to 4" C.P.

SPUR GEARS — Hobbed Generated — to 108" dia., 18" face — up to 1 D.P.



SPUR GEARS — Fellows Generated—to 140" dia., 8" face, up to 1 D.P.

SPUR GEARS — Ground tooth up to 18" dia., 12" face — 2 D.P.

INTERNAL GEARS — Form cut up to 72" dia., 12" face — up to 1 D.P.

INTERNAL GEARS — Generated up to 120" dia., 8" face — up to 1 D.P.

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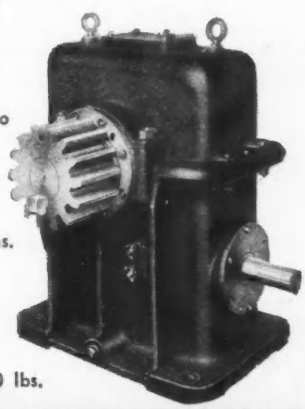

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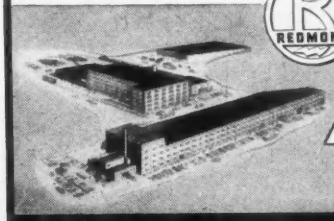

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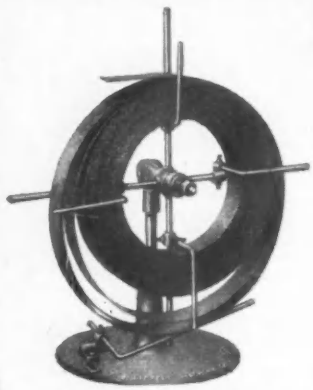
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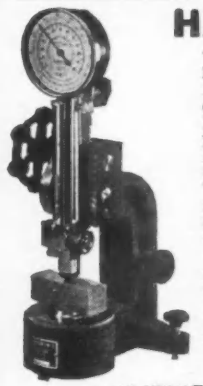
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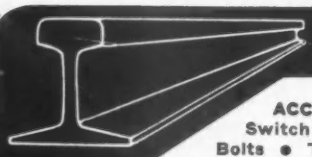
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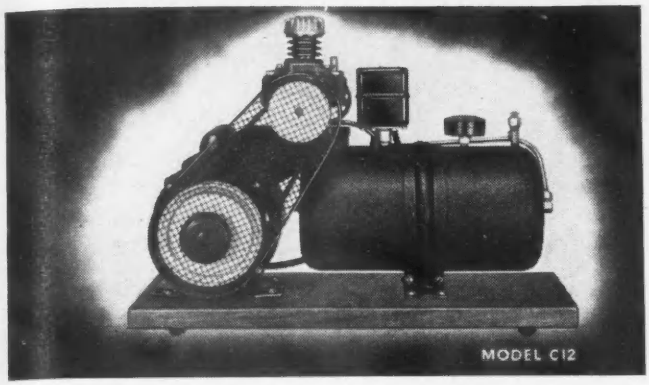

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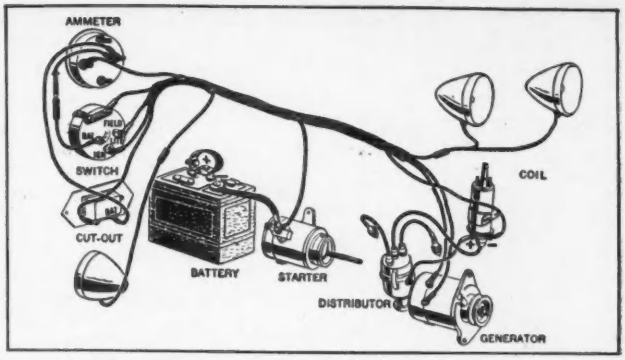

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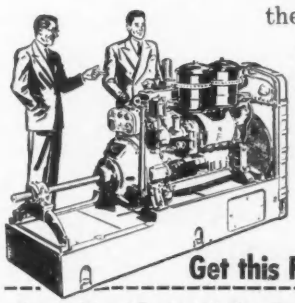

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Acadia Div., Western Felt Works 136
Accurate Spring Mfg. Co. 136
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Ajax Manufacturing Co. —
Aluminum Co. of Amer. 123
Aluminum Industries, Inc —
American Bosch Corp. —
American Brake Shoe Co. —
American Broach & Machine Co. —
American Chain & Cable Co., Inc. 90
American Chemical Paint Co. 67
American Electric Fusion Corp. 83-84
American Screw Co. —
American Steel & Wire Co. —
Anderson, O. L. —
Armstrong Cork Co. 57
Aro Equipment Corp., The —
Associated Spring Corp. —
Automatic Transportation Co. —
Automotive & Aircraft Div., Amer. Chain & Cable Co. —
Automotive Gear Works, Inc. 65

Bakelite Corp —
Barber-Colman Co. —
Barnes Corp., John S. 88
Barnes Drill Co. —
Bendix Aviation Corporation
Bendix Products Div. 10
Eclipse Machine Div. 61
Scintilla Magneto Div. 132
Stromberg Elmira 61
Zenith Carburetor Div. —
Bendix-Westinghouse Automotive Air Brake Co. 124
Berry Motors, Inc. 81
Besly and Co., Chas. H. 87
Bethlehem Steel Co. —
Birdsboro Steel Foundry & Machine Co. 100
Blakeslee & Co., G. S. 136
Bliss & Laughlin, Inc. 116
Booth Felt Co. —
Borg & Beck Div., Borg-Warner 60
Bower Roller Bearing Co. —
Brad-Foote Gear Works 135
Brown Instrument Co., The —
Buell Manufacturing Co. 137
Builders Steel Supply Co. 136
Bullard Company —
Bundy Tubing Company 6
Bunting Brass & Bronze Co. —

Caldwell Industries, Inc. 137
Camcar Products Co. —
Campbell, Wyant & Cannon Foundry Co. —
Carboloy Company, Inc. 112
Carnegie-Illinois Steel Corp. —
Central Screw Co. —
Central Sheet Metal Works, Inc. —
Central Steel & Wire Co. 14
Chambersburg Engineering Co. 66
Chicago Rawhide Mfg. Co. —
Cincinnati Milling Machine Co. —
Cincinnati Tool Co., The 137
Classified Advertisements 96
Clearing Machine Corp. 93
Cleveland Punch & Shear Wks. Co. 114
Clifford Manufacturing Co. —
Columbia Steel Co. —
Continental-Diamond Fibre Co. —
Continental Motors Corp. 11
Continental Screw Co. —
Continental Tool Works —
Corbin Screw Div. —
Cotta Transmission Co. —
Cross Company, The —
Cullen-Friestedt Co. 96

Danly Machine Specialties, Inc. 76-77
Detrex Corporation —
Detroit Diesel Engine Div. 137
Detroit Gasket & Mfg. Co. —
Disston & Sons, Inc., Henry —
Dole Valve Co., The 68
Donaldson Co., Inc. —
duPont deNemours & Co., Inc., E. I. —
Dykem Co., The —
Dynamatic Corp., Sub. Eaton Mfg. Co. 125

Eaton Manufacturing Co. 125
Elco Tool & Screw Corp. —
Electric Auto-Lite Co., The —
Electric Furnace Co., The —
Electric Storage Battery Co. —
Electro-Alloys Div. —
Elwell-Parker Electric Co. —
Equipment Sales Div., Raybestos-Manhattan, Inc. —
Essex Wire Corp. 64
Ex-Cell-O Corporation —

Fairfield Mfg. Co. 70
Fansteel Metallurgical Corp. 72
Federal-Mogul Corp. —
Federal Press Co., The —
Federated Metals Div. —
Felters Co., The 132
Fitzgerald Mfg. Co., The —
Foote Bros. Gear & Machine Corp. 91
Ford Motor Co. —
Fuller Manufacturing Co. 126

G & O Mfg. Co., The —
Gabriel Company —
Gairing Tool Co., The —
Galland-Henning Mfg. Co. 74
Gast Manufacturing Corp. —
Gear Grinding Machine Co. 118
General Controls 134
General Electric Co. —
Gisholt Machine Co. 8
Globe-Union, Inc. —
Goodrich Chemical Co., B. F. 89
Great Lakes Steel Corp. 71
Greenlee Bros. & Co. —
Gunite Foundries 92

Handy & Harman —
Hannifin Corp. 136
Hanson-Van Winkle-Munning Co. —
Harper Co., H. M., The —
Heald Machine Co., The 2nd Cover
Herbrand Division, The Bingham-Herbrand Corp. 103
Hoover Ball & Bearing Co. —
Hotel Cleveland 96
Houde Engineering Div. —
Houghton & Co., E. F. 128
Howell Electric Motors Co. —
Hyatt Bearings Div. 7

Illinois Coil Spring Co. —
Industrial & Marine Engine Div., Ford Motor Co., —

Ingersoll-Rand —
Inland Manufacturing Div. —
Inland Steel Company 53
Internationl Nickel Co., Inc. 115

Johansson Div., Ford Motor Co. —
Johnson Bronze Co. —
Johnson Products, Inc. —
Johnston & Jennings Co. —
Jones & Laughlin Steel Corp. 13

Kelsey-Hayes Wheel Co. —
Kent-Owens Machine Co. —
Kester Solder Co. 82
King-Seeley Corp. —

Lake Erie Engineering Corp. —
Lamb Electric Company 62
Laminated Shim Co., Inc., —
Lamson & Sessions Co. —
Layne & Bowler, Inc. —
Leeds & Northrup Co. —
Lewis Spring & Mfg. Co. 86
Lipe-Rollway Corp. 105

Index to

The Advertisers' Index is published of the advertising contract. Every rectly. No allowance will be made

Advertisers

as a convenience, and not as part care will be taken to index correctly for errors or failure to insert.

Littlefuse, Inc. —
Littell Machine Co., F. J. 136
Logan Engineering Co. —
Long Manufacturing Div. 97
Lord Manufacturing Co. —
Lyon Metal Products, Inc. 4

Magnaflux Corp. —
Mahon Co., The R. C. —
Mallory & Co., Inc., P. R. 104
Mattison Machine Works —
Mechanics Universal Joint Div. 127
Merz Engineering Co. —
Michigan Steel Tube Products Co. 75
Micromatic Hone Corp. —
Midland Steel Products Co. 106
Milford Rivet & Machine Co. —
Milsco Manufacturing Co. —
Moline Tool Company —
Moraine Products Div. —
Muskegon Piston Ring Co. 5

Nadelle —
National Acme Co., The 129
National Broach & Machine Co. —
National Formetal Co., Inc. —
National Lock Co. —
National Motor Bearing Co., Inc. 131
National Screw & Mfg. Co., The —
National Steel Corp. —
National Tube Company —
New Britain Machine Co. 69
New Departure Div. —
New England Screw Co. —
Newcomb-Detroit Co. —
Nikoh Tube Company 119-120
North American Aviation, Inc. —
Norton Company —

Page Steel & Wire Div., Amer. Chain & Cable Co., Inc. 90
Palnut Company, The 78
Pannier Bros. Stamp Co. —
Parker-Kalon Corp. —
Parker Rust Proof Co. —
Pawtucket Screw Co. —
Pedrick Piston Rings. —
Permanente Products Co. —
Permatex Co. Inc., 55
Pheoll Mfg. Co. —
Phillips Screw Mfgrs. —
Physicists Research Co. —
Pierce Governor Co., Inc., —
Potter & Johnston Co., Sub. Pratt & Whitney 136
Preis Engraving Machine Co., H. P. —
Production Devices, Inc. —
Progressive Welder Co. 12

Ramsey Corporation —
Raybestos-Manhattan, Inc. —
Reading Screw Co. —
Redmond Co., Inc. 135
Reed & Prince Mfg. Co. 110
Reeves Bros., Inc. 107
Revere Copper & Brass, Inc. 109
Reynolds Metals Co. 111
Reynolds Wire Company 73
Richards Co., J. A. 136
Rockford Clutch Div. 80
Rockford Magnetic Products Co., Inc. —
Roper Corp., George D. —
Ross Gear & Tool Co. 9
Russell, Burdsall & Ward Bolt & Nut Co. —
Ryerson & Son, Inc. Joseph T. 16

SKF Industries, Inc. 102
Saginaw Div., Eaton Mfg. Co. —
Schmieg Industries —
Schrader's Son, A. —
Schwitzer-Cummins Co. —
Sealed Power Corporation 59
Seneca Falls Machine Co. —
Service Spring Co. —
Shakeproof, Inc. —
Shore Instrument & Mfg. Co. 136
Shuler Axle Co. —
Sibley Machine & Foundry Corp. —
Simonds Abrasive Co. 2
Smith Mfg. Co., Inc., F. A. 85
Southington Hardware Mfg. Co. —
Sparks-Withington Co., The —
Spicer Mfg. Div., Dana Corp. —
Sponge Rubber Products Co. 108
Standard Oil Co., (Ind.) —
Standard Pressed Steel Co. —
Steel Co. of Canada, Ltd., The —
Sterling Aluminum Products, Inc. —
Sterling Bolt Co. —
Strand & Co., N. A. —
Strom Steel Ball Co. —
Stronghold Screw Products, Inc. —
Stuart Oil Co., Ltd., D. A. 90
Sturgis Products Co. —
Sun Oil Company —
Sunstrand Machine Tool Co. 98-99
Superior Steel Corp. 101

Taylor Manufacturing Co. —
Tennessee Coal, Iron & R. R. Co. —
Texas Company, The —
Thompson-Bremer & Co. 3rd Cover
Thompson Products 79
Timken Roller Bearing Co., The Back Cover
Tomkins-Johnson Company, The —
Torrington Co., The —
Tourek Mfg. Co. J. J. 3
Towmotor Corp. —
Trico Products Corporation 63
Tung-Sol Lamp Works, Inc. —
Tuthill Spring Co. —
Twin Disc Clutch Company —

Union Carbide & Carbon Corp. —
Union Pacific Railroad 117
Unitcast Corp. —
United Specialties Company 136
United States Rubber Co. 133

Vanadium Corp. of Amer. 113
Vickers, Inc. —
Victor Manufacturing & Gasket Co. —

Waldes Kohinoor, Inc. —
Wales-Beech Corp. —
Warner Electric Brake Mfg. Co. —
Waukesha Motor Company 1
Western Felt Works 136
Westinghouse Electric Corp. 94-95
Wico Electric Company 122
Wilkening Mfg. Company —
Williams & Co., J. H. —
Wilson Co., The H. A. —
Wolverine Bolt Co. —
Wood Co., R. D. —
Worcester Stamped Metal Co. 136
Wrigley Jr., Co., Wm. —
Wrought Washer Mfg. Co. —
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Zollner Machine Works 140

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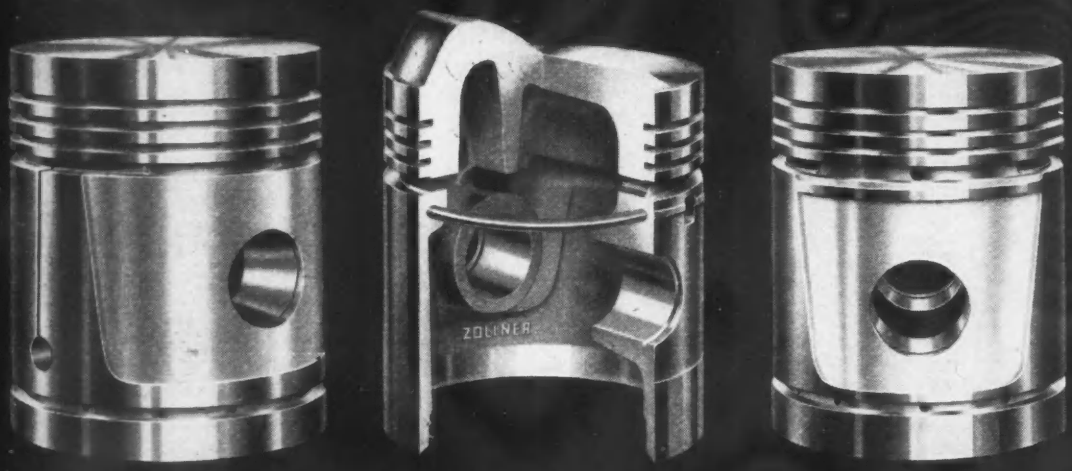

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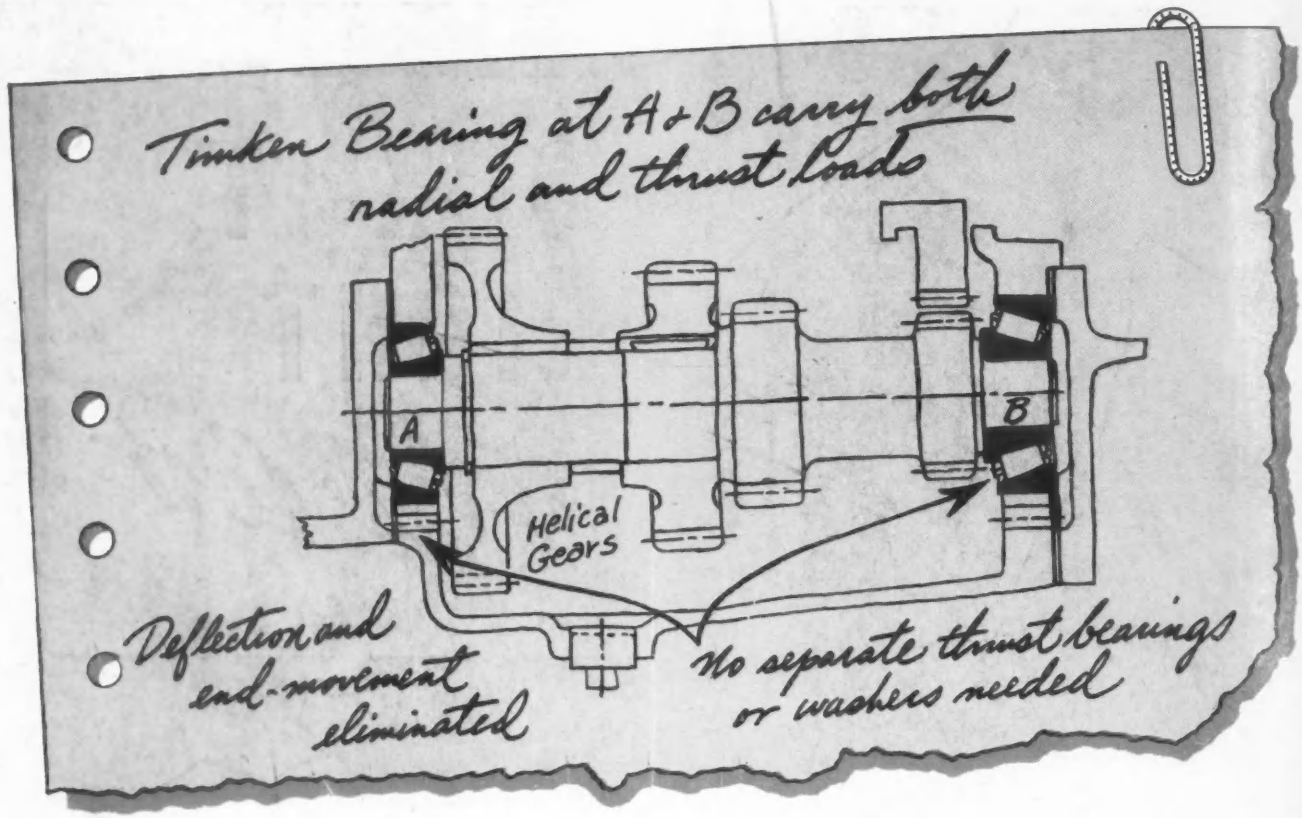
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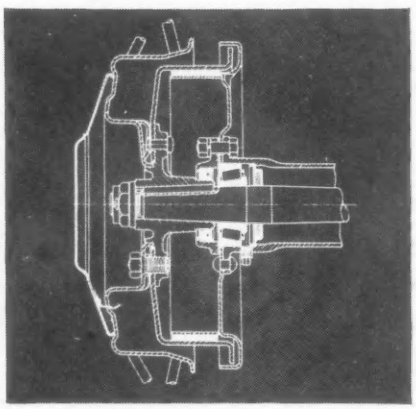

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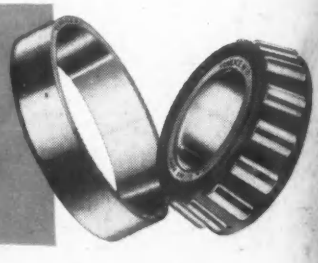

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